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XV.

CONTRIBUTIONS TO AMERICAN BOTANY.

BY ASA GRAY.

Communicated December 8, 1886.

1. *Revision of some Polypetalous Genera and Orders
precursory to the Flora of North America.**Papaveraceæ.*

The following is thought to be a somewhat improved arrangement of the North American genera.

Tribe I. PLATYSTEMONEÆ. Leaves mainly opposite or whorled and entire. Flowers usually trimerous, with a lobed or angled ovary, and a distinct stigma terminating each carpel and so alternate with the placentæ. *Platystemon*, *Platystigma*.

Tribe II. PAPAVEREÆ. Leaves mainly alternate. Flowers rarely trimerous. Carpels completely combined, even the stigmas confluent or radiate from a common centre, never more numerous than the placentæ. — I. Petals (4 or 6) usually scarious-marcescent and persistent till the fruit matures: capsule of 3 to 6 valves alternating with as many nerviform placentæ. *Canbya*; trimerous, and stigmas opposite placentæ. *Arctomecon*; dimerous, and stigmas alternate with the placentæ. II. Petals 8–12, not crumpled in bud, which is never drooping; deciduous stigmas (2) alternate with the placentæ. *Sanguinaria*. III. Petals 4 or 6, usually crumpled in the bud, deciduous. 1. Shrubby, and with stigmas over the two valves, i. e. alternate with the nerviform placentæ. *Dendromecon*. 2. Shrubby-based, pluricarpellary, and stigmas over the septiform placentæ. *Romneya*. 3. Herbaceous, and stigmas over the placentæ. *Argemone*, *Papaver*, *Meconopsis*, *Stylophorum*, *Chelidonium*, *Glaucium*.

Tribe III. HUNNEMANNIÆ. Leaves alternate. Flowers dimerous, erect in the bud, as if perigynous from dilatation and excavation of the torus. Stigmas twice or thrice as many as the placentæ. Capsule siliquiform, pluricostate, elastically two-valved from base to apex. *Hunnemannia*, *Eschscholtzia*.

ESCHSCHOLTZIA, Cham. From the mass of diverse forms which, in the lack of a better understanding, we have been in the habit of accumulating under the name of *E. Californica*, Mr. Watson first separated a very small-flowered one as *E. minutiflora*; and recently Prof. Greene, in a monographic revision of the genus, has described several species. Unfortunately he had not the types of the older annual species. The recognition of *E. Californica* as a perennial, which, though long known, had been generally overlooked (because it promptly blossoms the first year and is cultivated as an annual), has been helpful. It was not quite clear what *E. cæspitosa*, *E. tenuifolia*, and *E. hypocoides* were founded on; and a further uncertainty was introduced by Mr. Bentham's reference, in *Plantæ Hartwegianæ*, of an obvious *E. Californica* to *E. tenuifolia*, although with misgiving. An inspection of the originals now makes it clear that these three annual species are all one. *E. cæspitosa* and *E. tenuifolia*, which are quite alike, represent the form with leaves mainly subradical, and *E. hypocoides*, a leafy-stemmed and shorter-peduncled form. It should be mentioned, however, that, in the Kew herbarium, the only original of *E. cæspitosa* is that of the Hookerian herbarium. If there was one in that of Bentham (as is probable), it is not in place. Of these three specific names that of *E. cæspitosa* should be preferred for the species, that of *E. hypocoides* relating to a less usual form, probably growing in shade. Then the name of *E. tenuifolia*, Hook. (not of Benth.), may be retained for the very distinct species figured in Bot. Mag. t. 4812, and taken up under this name by Greene, who detected the unique character of its seeds.

I cannot yet well define the species, but the subjoined arrangement may be offered.†

† ESCHSCHOLTZIA, Cham.

1. Dilated torus funnellform, bearing an expanded rim outside of the insertion of the calyptate calyx (but variable in width): mature seeds with a coarse and salient superficial reticulation of the episperm: anthesis of 3 or 4 days.

* Perennial, large-flowered.

E. CALIFORNICA, Cham., of which *E. Douglasii*, Torr. & Gray, and *E. tenuifolia*? Benth. Pl. Hartweg. 296, are forms with narrower border to the torus.

* * Winter annual, low, small-flowered: petals 5 to 8 lines long.

E. PENINSULARIS, Greene, Bull. Calif. Acad. i. 68. Southern and Lower California, where it is the common species.

2. Dilated torus destitute of expanded rim or border, although the margin sometimes becomes sphacelate in age, a hyaline internal edge (within the inser-

Portulacaceæ.

In this as in most other very natural orders, the genera are difficult of limitation. But the forms appear not to run together in the way they do in such an order as the *Polemoniaceæ*, perhaps because the species are fewer, yet they give the systematist much trouble. I propose to arrange the North American genera as follows.

Perigynous; i. e. calyx partly connate with the ovary and capsule, both circumscissile. 1. PORTULACA.

Hypogynous: i. e. calyx, corolla, &c. free.

Shrubby: seeds and embryo merely uncinately-curved. 2. TALINOPSIS.

Herbaceous: embryo coiled round central albumen.

Calyx 2-sepalous, herbaceous, deciduous, sometimes tardily so. Stamens 5 to 30. 3. TALINUM.

Calyx 4-8-sepalous, herbaceous, persistent: petals 5 to 16: stamens 10 to 40: capsule circumscissile at very base. 4. LEWISIA.

tion of the calyx) commonly a little projecting: annuals, mostly either low or slender.

* Petals 4 to 8 or 12 lines long, broadly cuneiform, lasting more than one day.

+ Seeds superficially reticulated or else smoothish.

→ Stems equably and very leafy to the top, branching above: leaves mostly surpassing the peduncles, finely decomposed into very narrow linear divaricate divisions and lobes: petals seldom half-inch long: herbage wholly glabrous and glaucous.

E. RAMOSA, Greene, Bull. Torr. Club, 1886. *E. elegans*, Greene, Bull. Calif. Acad. i. 182. *E. Californica*, var. *hypercoides*, Watson, Proc. Am. Acad. xi. 112, the small-flowered plants. Islands off the coast of Lower California, *Streets*, *Palmer*, *Greene*, and Santa Cruz Island off Santa Barbara, *Greene*.

→ → Stems scapiform or sparsely leafy: divisions of leaves fewer and less divergent.

E. CÆSPITOSA, Benth. Herbage often hispidulous when young, at least the petioles, sometimes quite glabrous: leaves thinnish; the lobes and divisions from filiform-linear to linear-cuneate: petals pure yellow, half-inch to inch long. *E. cæspitosa* and *E. tenuifolia*, Benth. l. c.; both subscapose and slender-leaved. *E. Austinæ*, Greene, Bull. Calif. Acad. i. 69. A common species in California; passing doubtless into

Var. HYPERCOIDES, *E. hypercoides*, Benth. l. c., a form more leafy-stemmed, with less finely dissected leaves, and smaller flowers.

E. MEXICANA, Greene, l. c. Stouter and dwarf, wholly glabrous and glaucous, with leaves of much thicker texture and coarser dissection, the lobes crowded: peduncles 2 to 10 inches long, mostly scapiform: petals orange-yellow, broad, half-inch to almost an inch long. *E. Douglasii*, var. *parvula*, Gray, Pl. Wright. ii. 10. The most eastern species, extending from the Rio Grande in New Mexico to S. Utah and probably the borders of S. California. At Paso del Norte and below, Wright collected it within the Mexican lines, thus barely justifying the

Calyx 2-sepalous, wholly persistent.

Herbaceous sepals concave, not scarious : gynœcium 3-merous.

Petals 5 to 10, rarely only 3, mostly ephemeral : stamens 5 (rarely 3) to 25, seldom of same number as the petals : ovules and seeds several or numerous : capsule either circumscissile or 3-valved from summit.

5. CALANDRINIA.

Petals 5, seldom ephemeral : stamens 5 (or 3 in two Montoid species) : ovules and seeds few.

6. CLAYTONIA.

Petals 5, unequal and united below into a short cleft tube : stamens 3 : seeds 2 or 3.

7. MONTIA.

Scarious or partly scarious rounded sepals plane : gynœcium 2-merous : capsule 2-valved.

8. CALYPTRIDIMUM.

I make no account of the character of seeds strophiolate or estrophiolate, introduced, I believe, by Fenzl and kept up by Bentham and Hooker, to distinguish *Talinum* from the genera that follow it. For, indeed, the strophiole is obscure or wholly wanting to the seeds of the typical species of *Talinum* (as Rohrbach in Fl. Brasil. notices) ; and,

specific name. To this may doubtfully be referred *E. elegans*, Greene, l. c. (excl. var. *ramosa*), coll. on Guadalupe Island by Palmer and Greene.

+ + Seeds with a thick very coarsely and deeply pitted coat : divisions of the leaves filiform-linear.

E. GLYPTOSPERMA, Greene, l. c. A low scapose species, with finely dissected leaves, from the Mohave Desert, to which probably belongs *E. Parishii*, Greene, l. c. 183, from farther south.

+ + + Seed-coat strongly muricate-squamose in about 12 longitudinal rows : stems low and slender, somewhat hispidulous-pubescent below : leaves with comparatively few and simple narrow-linear divisions.

E. TENUIFOLIA, Hook. Bot. Mag. t. 4812, not Benth. Name which may be retained, since the homonym of Bentham is a strict synonym of his *E. cæspitosa*. Moreover, it is what Greene took up for *E. tenuifolia*, and he first described the peculiar seeds. It is *E. Douglasii*, var. *tenuifolia*, Torr. Pacif. R. Rep. iv. 14, and the *E. Californica*, var. *cæspitosa*, Brewer & Watson, Bot. Calif. i. 23. It occurs in the valley of the Sacramento and the foot-hills of the Sierra Nevada, and probably was first collected by Fremont.

* * Petals quarter-inch long or mostly less, obovate, promptly deciduous or caducous : seeds with reticulate surface.

E. MINUTIFLORA, Watson, Proc. Am. Acad. xi. 122. A leafy-stemmed and small-leaved species, with petals only a line or two long, of the interior arid region.

E. RHOMBIPETALA, Greene, Bull. Calif. Acad. i. 71. A depressed-spreading low species, commonly scabro-hispidulous below, with stout subscapose peduncles, and fugacious rhombic-obovate petals, of 3 or 4 lines in length ; found only in the valley of the San Joaquin and lower part of the Sacramento, by Mrs. Curran.

on the other hand, this appendage is present in the original *Calandrinia* (*caulescens*) and a good part of the other annual species, is developed even into an arillus in one of our perennial species, and is more or less conspicuous nearly throughout *Claytonia* and *Montia*. Indeed, Bonpland describes it in his *Claytonia Cubensis*, i. e. *C. perfoliata*.

It will be seen that *Lewisia*, instead of being quite anomalous in the order, is very closely related to *Calandrinia*, that is, to its thick-rooted species; and that these species all have the basally circumscissile dehiscence of the capsule, which was supposed to be peculiar to *Lewisia*.

PORTULACA. The three flat-leaved species remain as characterized by Dr. Engelmann in Pl. Lindheimerianæ. Of the terete-leaved species we seem to have four which may on the whole be distinguished, viz.:—

P. STELLIFORMIS, Moçino & Sesse: perennial by creeping tuberous-thickened and sometimes moniliform rootstocks: leaves quite terete, an inch long, those involucreting the flower-cluster radiating and much surpassing it: axillary clusters of hairs short and soft: petals copper- or buff-color, obcordate: seeds blackish, granulate-tuberculate, with metallic lustre. For the name see DC. Prodr. iii. 353. It is fairly represented, in the Ic. Fl. Mex. ined. Calques, t. 389, and is the *P. suffrutescens*, Engelm. in Bot. Gazette, vi. 326; but it is not suffrutescent. Plains of W. Texas to Arizona and Mexico.

P. HALIMOIDES, L.: a fleshy-rooted perennial, yet flowering as an annual: leaves short and flattish, with copious axillary hair: petals yellow: capsule-lid depressed and much shorter than the basal portion: seeds granulose, reddish, at least when young. Keys of Florida and W. Indies.

P. PILOSA, L.: annual, the base often indurating in age: leaves nearly terete, linear-subulate, half or quarter inch long, with copious hair in axils: petals carmine, crimson, or purple, a line or two long, retuse: capsule-lid hemispherical: seeds blackish and with metallic lustre, muriculate-granulose. Florida to Arizona, and widely dispersed over warm regions.

P. PARVULA. Annual, but sometimes fleshy-rooted, depressed and diffuse: leaves nearly terete, oblong-linear, obtuse, 2 to 5 lines long, copiously hairy in the axils: petals yellow and copper-colored, barely a line long: lid high hemispherical, fully as long as basal part of the capsule: seeds pale red, minutely granulate. This is a part of *P. pilosa*, Gray, Pl. Fendl., Pl. Wright., &c., was collected by Wright and by Fendler on the plains of W. Texas and New Mexico, and in Mexico by Schaffner (772), Pringle (543), &c.

TALINOPSIS, Gray. Mexican specimens of *T. frutescens*, collected by Pringle, Parry & Palmer, and Schaffner, well confirm the characters of this genus, which has no near relative on the American continent except *Grahamia* in Chili.

TALINUM, Adans. Although diverse in habit, the genus is very well marked.

T. PATENS, Willd., is our only flat-leaved and amply paniculate species. We have in Texas and Arizona both the rose-colored and the yellow-flowered forms. *T. spathulatum*, Engelm., is of the latter, and answers to *T. reflexum*, Cav.; and Var. **SARMENTOSUM** (*T. sarmentosum*, Engelm.) is a procumbent form of it.

T. LINEARE, HBK., a flattish-leaved and axillary-flowered fleshy-frutescent species, the *Calandrinia tuberosa*, Benth. Pl. Hartw. (in which probably the calyx falls from the mature capsule), is doubtless the name to be adopted for the Texano-Arizonian and Mexican *T. aurantiacum*, Engelm. in Pl. Lindh., Pl. Wright., &c.

T. BREVIFOLIUM, Torr. in Sitgreaves Rep. 156, is a little known dwarf species found on the Colorado Chiquito, in N. W. New Mexico; and to this (although they have not been compared) must belong *T. brachypodium*, Watson, in Proc. Am. Acad. xx. 355, which the Lemmons scantily collected in the same district.

The following species are of the section of which *T. teretifolium* is the type, having terete linear leaves, and flowers in terminal pedunculate and commonly scapiform naked cymes. There is a tendency in the capsule of all of them to a separation of the filiform sutures from the valves, the former persisting as a kind of replum.

T. HUMILE, Greene, in Bot. Gazette, vi. 183, thus far found only by the founder of the species on the Pinos Altos Mountains in New Mexico, is known by the short peduncle of its 5-20-flowered cyme, which is surpassed by the leaves, and by the "light yellow petals changing to orange."

The following have slender scapiform peduncles much surpassing the leaves.

T. SPINESCENS, Torr. in Wilkes Pacif. Ex. Exp. xvii. 250. Specimens from Brandegee and Suksdorf have made this species better known. The short and fleshy caudex is beset with little subulate spines, which are the indurated and persistent midribs of the older (half-inch long) leaves, thus formed in the same way as those of *Fouquieria*. The stamens are 20 or 30 in number, and the petals rose-red, as also in the two following species, viz.:—

T. TERETIFOLIUM, Pursh., our well-known Eastern species, and

T. CALYCINUM, Engelm., in Wisliz. Rep. 4; a species of the Upper Arkansas region.

T. PARVIFLORUM, Nutt., is paler-flowered and pentandrous. *T. confertiflorum*, Greene, in Bull. Torr. Club, viii. 121, appears to be a form of this species.

LEWISIA, Pursh. Sir Wm. Hooker was correct in figuring the embryo of *L. rediviva* as with *accumbent* cotyledons. So far as we know, it is not so in any other Portulacaceous plant, not even in *L. brachycalyx*, Engelm. (a badly chosen name), which connects the genus very closely with *Calandrinia*. In fact, the tetrasepalous calyx makes the only difference.

CALANDRINIA, HBK., was founded upon two species. The type is *C. caulescens*, an annual, with leafy stem and 3-valved persistent capsule. Of the other species, the stemless and very thick-rooted *C. acaulis*, the fruit was not known. It proves to be thin-walled, circumscissile at the very base, thence splitting upward more or less; indeed, it is just that of *Lewisia*. We have a good series of North American species of the same type; but the group cannot properly be regarded as generic, for the same dehiscence occurs in several Chilian caulescent perennial species of unlike habit, and probably in some annuals. Of this marked *Lewisioïd* section, *PACHYRRHIZEA*, I recognize the following species.

1. With seeds not at all or not manifestly strophiolate, the testa mostly very smooth and shining.

a. Low, with large fleshy root (caudex and root together) napiform or conical: scapes 1-3-flowered, not surpassing the linear or spatulate radical leaves.

C. ACAULIS, HBK., of Mexico and northern part of the Andes.

C. NEVADENSIS, Gray, Proc. Am. Acad. viii. 623, and

C. PYGMÆA, Gray, l. c., species of the Rocky Mountains and the Western sierras.

b. Scapes or scapiform flowering stems a span or two high from a multipital caudex and long thick root, paniculately several-many-flowered: leaves mainly rosulate on the caudex, very fleshy: sepals (as in the last preceding species) rounded or truncate, erose-dentate or fimbriate, very much shorter than the obovate rose-red petals.

C. COTYLEDON, Watson, Proc. Am. Acad. xx. 355. Mountains on the borders of California and Oregon. *C. oppositifolia*, Watson, l. c., also discovered by Mr. Howell in the same district, is thought to be a

good allied species, but it may be only a more caulescent form of *C. Cotyledon*, a species very well named from the character of its foliage.

C. LEANA, Porter, narrow-leaved and paniculately many-flowered, is now known from British Columbia down to the vicinity of Shasta in California; unless two nearly related species are concerned.*

The fact that all these species have basilar circumscissile dehiscence of the capsule was made known to me by Professor Henderson and the Brothers Howell.

2. Seeds conspicuously strophiolate; the testa granulate.

C. TWEEDI, Gray. Habit of *C. Cotyledon*; caudex and root very thick: leaves obovate, fleshy, 2 to 4 inches long, an inch or two wide, rather shorter than the 1-3-flowered fruiting scapes: sepals and bracts entire and glandless, the former orbicular: petals an inch long: stamens 10 or 11: capsule 20-30-seeded, 3-valved from the base upward: seeds with a large and loose orbicular and squamiform arillus rather than strophiole!—Wenatchee Mountains, Washington Territory; alpine, *Tweedy* and *Brandege*.

Of the *EUCALANDRINIA* section we have the following species; all annuals.

C. CAULESCENS, HBK., the undoubted type of the genus, S. American, Mexican, and extending into Arizona and to the Columbia River. *C. micrantha*, Schlecht., is evidently a small-petalled form of it. The seeds of this species are as obviously carunculate as are most species of *Talinum*. Var. *MENZIESII*, the *Talinum (Calandrinia) Menziesii*, Hook. Fl. i. 223, t. 70, very common on our western coast, I take to be only a variety of *C. caulescens*, with longer-pedicelled and larger 4-11-androus flowers; but the extreme forms seem to be different enough. Some of them approach the Chilian *C. pilosiuscula*.

C. BREWERI, Watson, Bot. Calif. i. 74, differing mainly in the larger flowers on longer and soon refracted pedicels, and much exserted narrow capsule, is confirmed by a specimen gathered by Mr. Orcutt in Lower California.

C. MARITIMA, Nutt., a depressed species, with most of the leaves rosulate at the root, and an obtuse ovoid capsule, has conspicuously strophiolate seeds.

* The plant of the mountains of Oregon and Washington Terr. (coll. by Lyall as far north as lat. 49) is distinguished by Mr. Thomas Howell as *C. Columbiana*, because of its broader and less terete leaves, not glaucous, and flowering stems less scapiform, these after comparatively transient flowering disarticulating from the stock.

C. SESUVIOIDES. Depressed and spreading from a stout tap-root, but seemingly not perennial, very succulent, leafy: leaves linear-spatulate, flattish, strong-edged, very obtuse, inch or more long, some of them opposite: flowers in terminal and lateral subumbelliform clusters: pedicels rather longer than calyx: sepals broadly ovate, obtuse, nearly equalling the chartaceous capsule, as long as the 5 obovate white petals: stamens 5 to 8: style very short: stigma subcapitate, undivided: seeds shining, minutely punctulate, not at all strophiolate. — *Claytonia ambigua*, Watson, Proc. Am. Acad. xvii. 365. Desert on the lower part of the Colorado River, at Indio, and at El Rio, on the Californian side, *Lemmon, Parish*.

CLAYTONIA, Gronov. A specially North American genus, with one singular outlier. Our species may be disposed as follows.

§ 1. EUCLAYTONIA. Perennial from a corm, thickened caudex and tap-root, or rootstock, sending up radical leaves and scapes or flowering stems bearing a single pair of opposite leaves (in one species sometimes a whorl of three, in another often alternate): flowers usually not ephemeral: stamens always 5: seeds smooth and shining.

* *Cormose*, the slender two-leaved stems and the few (seldom coetaneous) radical leaves from a deep globular corm: leaves linear to oblong: petals light-rose, usually with deeper-colored veins.

+ Intermediate between true *Claytonia* and the *Pachyrrhiza* section of *Calandrinia*; the oblong-conical capsule being 12–16-seeded, membranaceous, and dehiscent round the base: seeds smooth, not at all strophiolate: pedicels of the cymose inflorescence mostly subtended by small scarious bracts: anthesis seemingly ephemeral.

C. TRIPHYLLA, Watson, Bot. King Exp. 345. Leaves more frequently a single pair than a whorl of three. The basally circumscissile dehiscence was pointed out to us by Professor Henderson of Portland. Except for the strictly globose corm, I should refer this plant to *Calandrinia*.

+ + Typical *Claytonia*, the *Spring Beauty* of the Northern Atlantic States: capsule (as in the whole genus except the preceding species) 3-valved from the top and persistent: racemiform inflorescence mainly bractless: pedicels recurved or drooping in fruit: seeds with the small strophiole or white thickening at the hilum which is nearly universal in this genus.

C. VIRGINIANA, L. Seems nearly to pass into the next.

C. CAROLINIANA, Michx. An Atlantic species, extending to Sas-

katchewan and the mountains of New Mexico: along its western range seemingly confluent with

C. LANCEOLATA, Pursh. The cauline leaves of this are sessile, and vary from oblong to lanceolate, and the petals are emarginate or obcordate. Pursh's N. W. Coast and Siberian specimens, referred to this, probably are of *C. arctica*.

C. UMBELLATA, Watson, Bot. King Exp. 43, t. 6, f. 4, 5, & Bot. Calif. i. 77. The corm is usually obversely napiform: radical leaves not seen; cauline obovate and long-petioled. Known only from Nevada, near Virginia City (*Watson, Munn*), and from Stein Mountain, E. Oregon, where recently collected by *Howell*.

* * *Caudicose*, a rosulate cluster of radical leaves, surrounding scapiform flowering stems, directly from the very thick crown or perpendicular caudex, which is prolonged below into the fleshy tap-root: wing-margined petioles of radical leaves scarious-dilated and as it were sheathing at base: no sarmentose shoots or offsets: inflorescence racemiform or subcymose, with or without some small scarious bracts: petals white or pale rose-color.

C. MEGARRHIZA, Parry, in Watson, Bibl. Ind. 118. *C. arctica*, var. *megarrhiza*, Gray, Am. Jour. Sci. xxxiii. 406, & Proc. Acad. Philad. 1863, 59. This commonly bears two or three small alternate leaves or foliaceous bracts (spatulate-lanceolate or narrower and tapering at base) near the flowers, at least in the Colorado Rocky Mountains. In the mountains of Oregon, it nearly approaches the next.

C. ARCTICA, M. F. Adams. Distinguished from the preceding by the short racemiform cyme much surpassing the radical leaves, the cauline leaves ovate or broadly oblong and sessile by a broad base; from the next by the broad and obtuse leaves. It is the *C. Joanneana*, Rœm. & Schult. Syst. v. 434, a name happily two years later than that of Adams. It extends from the Alaskan shores and islands to adjacent Asia, and even to Altai.

C. TUBEROSA, Pall. May pass into the preceding, but has narrower and acute leaves, from lanceolate-obovate even to linear-lanceolate. It is the *C. acutifolia* as well as the *C. tuberosa* of Pallas, as published by Rœmer & Schultes from Willdenow's manuscript notes; the latter name to be preferred, the more so because the former has been used by Ledebour for a figure of the *C. arctica*. The most narrow-leaved form is *C. Eschscholtzii*, Cham. in Linnæa. This is mainly Asiatic, but comes near to us on Arakamtchetchene Island near Bering Strait, by Wright, and at Plover Bay by Rothrock; and Muir collected it somewhere in Arctic Alaska.

- * * * *Rhizomatose*, the long-petioled radical leaves and flowering stems (bearing a pair of broad sessile leaves below the racemiform nearly bractless inflorescence) from creeping and little-thickened rootstocks: petals obovate and emarginate or obcordate, rose-color or white: pedicels in fruit erect or ascending.

C. SARMENTOSA, C. A. Meyer; also of Seem. Bot. Herald, as to char., but the figures suspected to be of a small form of *C. arctica*; they show no trace of the creeping filiform rootstocks or stolons which characterize the species. Here probably, and according to Ledebour, belongs *C. Chamissoi*, DC. Prodr., not of Spreng. Our specimens are from St. Lawrence, St. Paul, and St. George Islands; and it occurs on both adjacent shores.

C. ASARIFOLIA, Bongard, Veg. Sitch. 157. By its creeping rootstock and hardly bracted inflorescence, this belongs to the *Euclaytonia* section, while the habit is just that of the following species, although perhaps more fleshy. The radical leaves tend to be subcordate or somewhat reniform, enough so to justify the specific name, although as commonly rhombic-ovate. Here belongs *C. cordifolia*, Watson, Proc. Am. Acad. xviii. 365, and a dwarfed form of the same is *C. Nevadensis*, Watson, Bot. Calif. i. 77. The species ranges from the Rocky Mountains in Montana and Idaho (*Lyall, Nevius, Watson*), and the Cascades of Oregon (*Henderson, Suksdorf*), south to the Sierra Nevada (*Lemmon*) and north to Sitka. Also Bering Island, *Dr. Steiniger*.

§ 2. LIMNIA. Fibrous-rooted annuals or perennials, destitute of rootstocks, corms, &c., but in one species bulbilliferous: one sepal commonly a little larger than the other, and the two petals alternating with these disposed to be larger than the others, at least in some species.

- * LIMNIA proper, including the species to which Linnæus gave this name in Act. Holm. 1746, and the two species taken up by Haworth: cauline leaves the single pair of *Euclaytonia*, near the mostly racemiform inflorescence; radical ones numerous and petioled: petals emarginate or obcordate: stamens always 5.

+ Green bracts accompanying most of the pedicels of the ample simply and loosely racemiform inflorescence: leaves thinnish; cauline pair distinct. Connects closely with the last preceding species.

C. SIBIRICA, L. Hort. Ups. 52, & Spec. i. 204; Gmel. Fl. Sibir. iv. 89; Sims, Bot. Mag. t. 2243; Sweet, Brit. Fl. Gard. t. 16, &c. *C. alsinoides*, Sims, Bot. Mag. t. 1309. *C. Unalaschkensis*, Fischer in Rœm. & Schult. Syst. v. 434. This came originally, as Gmelin states,

from the vicinity of Mt. St. Elias on the American coast and from the Alaskan Islands. In the absence of all evidence that it inhabits any part of the Asiatic continent, one might be disposed to discard the Linnæan name: but Siberia was a very indefinite geographical term; and we have the species from Bering Island, not far from the Asiatic shore. Linnæus described this species as a perennial; yet the specimens generally show a clearly annual root. We now know, from memoranda and fine specimens supplied by the Messrs. Howell, that while in exsiccated soil it is a pure annual, yet when better nourished it is more enduring, and bears offsets on stout stolons from the crown, and so, in the absence of much winter's cold, its life is continued and extended from year to year.

Var. *HETEROPHYLLA*, includes the various forms with leaves (especially the radical and sometimes the cauline also) varying from ovate-lanceolate to linear-lanceolate or even linear. *C. Unalaschkensis*, var. *heterophylla*, Nutt., & *C. alsinoides*, var. *heterophylla*, Torr. & Gray, Fl. Not uncommon on the Columbia River, where the extreme forms are singularly unlike the ordinary broad-leaved plant.

Var. *BULBILLIFERA*, *C. bulbifera*, Gray, Proc. Am. Acad. xii. 54, found by Greene in the Scott Mountains of N. California, and recently by Howell in adjacent Oregon, appears to be only a form of *C. Sibirica*, with thickened bases of the radical leaves, which persist on the crown as bulblet-scales.

† † Bracts few and minute or none: leaves more succulent; cauline pair commonly connate into a disk. Species seemingly confluent in a series.

C. PERFOLIATA, Donn. A weedy species, not known to have linear radical leaves, with pedicels seldom longer than the fruiting calyx (2 lines long) and apt to be fascicled or in pairs; the seeds large, turgid-lenticular, very shining, but granulate.

C. PARVIFLORA, Dougl., seems on the whole to be a good species, with radical leaves varying from spatulate to filiform-linear; cauline pair usually less discoid-connate, sometimes distinct on one side; flowers smaller and scattered in a loose raceme (yet sometimes all glomerate on the disk in both species), on slender pedicels: petals commonly pale rose-color, hardly double the length of the calyx: seeds only half as large as those of *C. perfoliata*, obscurely if at all granulate.

Var. *DEPRESSA*. A depauperate and depressed form, rather of this than of the preceding species, of which it has the broadly rhomboidal or ovate radical leaves (only a quarter-inch broad); and the small flowers are, so far as seen, glomerate-clustered on the foliar disk; the

calyx only a line long. On river-banks, probably sand-washes, Brit. Columbia to Oregon and adjacent Idaho.

C. SPATHULATA, Dougl. Small, but comparatively large-flowered, an inch to a span high, rarely taller, firm-fleshy and glaucous or pale: radical leaves terete and thickish-filiform, or becoming somewhat spatulate and flattish; cauline from lanceolate-ovate to narrowly lanceolate, rarely connate into a round peltate or cupulate disk, yet often connate on one side into an obcordate or 2-lobed body; in the typical form rather broad, only a quarter to half an inch long, and their broad bases slightly connate: raceme usually loose; the slender and mostly alternate pedicels a quarter to half an inch long: petals bright rose-color or white, thrice the length of the calyx: mature seeds conspicuously granulate. — Professor Greene, familiar with the living plant, first indicated to me the distinctions between this species and the preceding: I have settled the name and synonymy. The original *C. spathulata* of Hook. Fl. i. 225, t. 74, represents a common small form of it. *C. gypsophiloides*, Fisch. & Meyer, figured in Sert. Petrop. t. 35, and in Brit. Fl. Gard. ser. 2, t. 375, is a taller form. The species is taken up in Bot. Calif. ii. 435, as *C. exigua*. It occurs in open ground, especially where saline, from British Columbia to S. California, and it passes by various gradations into

Var. *TENUIFOLIA*. This has even the cauline leaves narrowly linear, or when growing filiform, half-inch to two inches long, little or not at all dilated at base, sometimes connate on one side; and the petals are commonly rose-color. It is *C. tenuifolia* and *C. exigua*, Torr. & Gray, Fl. i. 200, 201. In Pl. Fendl. 14, a seemingly thinner-leaved and taller form, of lax growth and somewhat dubious character, is mentioned. Same range as the typical form, the two sometimes growing together confluent.

* * *ALSINASTRUM*, Torr. & Gray, Fl. Habit and herbage, also the muriculate or tuberculate round-reniform seeds of *Montia*, but on a larger scale: stems elongated and bearing few or several pairs of opposite spatulate leaves, fibrous-rooting from lower nodes, and at least in one species flagelliferous and perennial by bulblets on the filiform runners: stamens 5.

C. CHAMISSONIS, Esch. in Spreng. Syst. i. 790 (but in the form of *C. Chamissoi*), & Cham. in Linn. vi. 562 (1831, the annexed note about esculent tubers to be excluded); Torr. & Gray, Fl. i. 676. *C. stolonifera*, C. A. Meyer, Act. Mosq. vii. 139, t. 3 (1829). *C. flagellaris*, Bong. Veg. Sitch. 137? *C. aquatica*, Nutt. in Torr. & Gray, Fl. i. 201.

C. HALLII, the *C. Chamissonis*, var. *tenerrima*, Gray, Proc. Am. Acad. viii. 378. Smaller, a span high, ascending, so far as known destitute of stolons and bulblets, apparently only annual: leaves only 2 or 3 pairs: pedicels in fruit ascending: fruiting calyx and capsule barely a line long: seeds one or two, more muriculate. — Wet ground, Oregon, *E. Hall*. Indian Valley in Plumas Co., California, *Lemmon*.

* * * *NAIOCRENE*, Torr. & Gray. Slender stems diffuse and at length reclined, bearing numerous alternate very fleshy leaves, or some flagelliform and less leafy, not rarely producing little fasciculate-leaved propagula in upper axils; the decumbent base fibrous-rooting, apparently perennial.

C. PARVIFOLIA, Moqino. *C. filicaulis*, Hook. Fl. i. 224, t. 72. The leaves, although so fleshy in the living state, are flat and thin in the dried specimens; the blade of the radical and lower cauline from a quarter to half an inch long, from spatulate or obovate to ovate. Petals from a quarter to a third of an inch long.

C. SARMENTOSA, Bongard, Veg. Sitch. 137, is still an imperfectly known and doubtful species. By the kind attention of Dr. Maximowicz, some of the original material has been submitted to my inspection. It would seem to be a species intermediate in certain respects between *C. parvifolia* and *C. Chamissonis*, with the alternate leaves of the former, and these broadly ovate, obovate, or the radical rotund, the larger of the latter with blade half an inch long: they evidently were fleshy, but seemingly less so than in *C. parvifolia*. I should still take it for a foliose and flaccid form of that species, except that the petals are said to be "more than half an inch long," and because *C. parvifolia* has not been received from Sitka. The stems or branches seem to terminate in a filiform stolon.

* * * * *MONTIASTRUM*. Leafy-stemmed and alternate-leaved annuals: leaves not very fleshy,

+ Broad and long-petioled, not unlike those of *Stellaria media*, and now and then lower ones opposite or nearly so: stamens 5: seeds densely lineate and transversely lineolate!

C. DIFFUSA, Nutt. This has now become well known, through specimens collected by *Kellogg & Harford*, *Suksdorf*, *Howell*, and *Rattan*.

+ + Narrow-leaved annuals, but lower nodes of stem sometimes rooting: racemiform inflorescence secund and pedicels recurved after flowering: leaves with base partly scarious and clasping: stamens three: seeds lenticular, thin-edged, very smooth: petals obviously unequal, as in *Montia*, but narrowed at base and all but distinct.

C. LINEARIS, Dougl. According to Professor Henderson, the stamens are always three and the petals decidedly unequal.

C. DICHOTOMA, Nutt. in Torr. & Gray, Fl. The larger forms of this little plant are not very obviously distinguishable from *C. linearis*. The smallest and most depressed include *Montia Howellii*, Watson, Proc. Am. Acad. xviii. 191, which agrees not badly with some of Nuttall's originals.

MONTIA, Micheli. The Northern forms of *M. fontana*, from Greenland and Newfoundland to Lower Canada and New Brunswick, and from Arctic Alaska to British Columbia, all have the areolate-tuberculate seeds with smoothed and somewhat shining surface of *M. rivularis*, Gmelin, Fl. Bad., or *M. lamprosperma*, Cham.; while those of Oregon and California have the duller and rather sharply muriculate seeds of *M. minor*, Gmelin. These differences do not correspond with any clear difference in habit. The species is singularly absent from the Atlantic United States.

SPRAGUEA, Torr. Of a single species: for I can make nothing more than a casual variation of *S. paniculata*, Kellogg. Mr. Watson has indicated (in Proc. Am. Acad. xx. 356) the near approach which one species of *Calyptridium* makes to this otherwise peculiar genus; and Professor Greene has consequently united the genera. I think that *Spraguea* should still be retained upon the assigned characters.

CALYPTRIDIMUM, Nutt. The genus was so named upon a partial misconception. The petals are not "united into a minute diaphanous conical corolla, slightly 3-toothed at the apex," as Nuttall supposed. They are quite separate, expanded in anthesis, which is ephemeral, then close over each other and over the pistil, are in this state detached from their insertion, and carried up on the forming fruit, just as in almost every plant of this family. Nuttall's conjecture that his plant might be the *Talinum monandrum*, Ruiz & Pav., was wrong. That is Fenzl's *Monocosmia*, of which it may here be remarked that the utricular capsule is just that of *Lewisia* and of *Calandrinia* § *Pachyrrhizea* on a small scale.

I distinguish four species of *Calyptridium* in two sections. The section which approaches *Spraguea* is here put foremost.

* Petals 4: stamens in the same species 1, 2, or 3: capsule little if at all surpassing the fructiferous calyx: seeds acute-margined.

C. QUADRIPETALUM, Watson, Proc. Am. Acad. xx. 356. A span high: leaves oblong-spatulate (larger 2 inches long, including tapering

base and petiole) : flowers crowded and as if imbricated in a naked and secund scorpioid spiciform inflorescence : sepals round-reniform, plane, at maturity fully 3 lines in diameter, white-scarious and rose-tinged with greenish centre : petals comparatively large : style very short : capsule oblong-oval, 10–20-seeded, not surpassing the fructiferous sepals. — Lake Co., California, *Torrey, Rattan*. Doubtless this half-Latin and half-Greek form of the name was an oversight ; but, as *petalum* has a precarious lodgment in the Latin dictionary, it may pass.

C. PARRYI. Depressed, small-leaved : leaves (only half-inch long) spatulate, or the rosulate radical ones cuneate-obovate with long tapering base : spikes in age secund and scorpioid : fructiferous sepals orbicular or oval, less complanate, herbaceous with narrow white margin, a line or two long, a little surpassed by the oblong capsule : style half the length of the ovoid ovary. — Bear Valley and vicinity, in mountains of San Bernardino Co., California, *Parry* (1876), *Parish*, 1885.

* * Petals 2 or 3 : stamen one, between two petals : sepals moderately accrescent, green and herbaceous with white-scarious margin : seeds more turgid, obtuse-edged : inflorescence looser and more paniculate.

C. ROSEUM, Watson, Bot. King Exp. 44, t. 6, f. 6–8. So far as known the flowers are dipetalous and monandrous ; the capsule ovate-oblong and covered by the calyx ; and the short style 2-parted.

C. MONANDRUM, Nutt. The petals are oftener 3 ; the filament subulate ; the very short style undivided ; the mature capsule linear and much exserted.

Malvaceæ.

The elaboration of this order for the Synoptical Flora of North America brings out several points which need to be noticed. The general lines of the arrangement proposed in Genera Fl. Am. Bor.-Or. Illustrata are found to hold. But the tribe *Malvæ* must have its subtribes reduced to two, allowing the *Sidææ* to include all the genera with capitate stigmas ; the number of ovules and seeds, whether one, two, or three, being quite incidental and variable. The first division of the *Sidææ* will be characterized by the reniform seeds with incurved embryo, at least the lower seed with inferior radicle (*Malvastrum*, *Sphaeralcea*, *Meliphlea*, *Modiola*) ; the second, by the turgid seeds with more conduplicate embryo, the ovules when one or two resupinate-pendulous and the radicle superior (*Sida*, *Anoda*, *Wissadula*, *Abutilon*, &c.).

SIDALCEA, Gray. The annual species of this well-marked genus are quite clear, and have recently been noted in Proc. Am. Acad. xxi. 409. They are *S. diploseypha*, *S. hirsuta*, and the badly named *S. calycosa* of M. E. Jones (*S. sulcata* of Mrs. Curran), with the outer phalanges of the andrœcium broad and rather distant from the inner; and *S. Hartwegi* with its var. *tenella* (*S. tenella*, Greene), having the narrower outer phalanges closely approximate to the terminal ones. There is also the ambiguous annual species, *S. malachroides*, which in addition to its peculiar habit is nearly diœcious. But several of the perennial species produce individuals with wholly female flowers.

The perennial species are hard to discriminate; but those indicated by Prof. E. L. Greene may probably be maintained, as also one or two more. Hoping for more light upon some of them, I here merely indicate, in a foot-note, my tentative distribution.†

† SIDALCEÆ PERENNES.

* Phalanges manifest, at least the exterior series: leafy-stemmed: some lowest cordate-orbicular leaves undivided.

+ Corolla uniformly white: anthers bluish.

S. CANDIDA, Gray.

+ + Corolla rose-color or mauve, rarely a white variety.

++ Herbage cinereous with soft and short pluriradiate stellular pubescence, no hirsute or hispid hairs: outer phalanges broad, bearing short filaments.

S. CALIFORNICA, Gray, Pl. Fendl. 19. *Sida Californica*, Nutt. in Torr. & Gray, Fl. i. 233. Abounds near Santa Barbara, in the Santa Inez Mountains.

++ ++ Herbage green, at least not cinereous: coarser pubescence when present of simple or geminate or some pauciradiate hairs.

= Mature carpels when dry rugulose-reticulated on the sides, mostly on the back also: petals half-inch to inch long.

S. MALVÆFLORA, Gray as to syn. *Sida malvæflora*, DC. *S. humilis*, Gray, Pl. Fendl. 20. The outline figure of Moçino & Sesse is perfectly decisive, and shows the characteristic hirsute hairs, the char. "glabriuscula" of the *Prodromus* notwithstanding. *Sida delphinifolia*, Nutt., is a form of it. Here also *Nuttallia malvæflora*, Fisch. & Meyer.

S. ASPRELLA, Greene, Bull. Calif. Acad. i. 78, founded on a lax and decumbent and unusually equably-leaved state of a usually erect and tall species, has no hirsute nor hispid pubescence, but is roughish with minute and dense almost scurfy stellular pubescence, or below glabrous; the petals are usually an inch long; the carpels rugose-reticulated throughout and glabrous at maturity, becoming concave or grooved on the back and acute-angled. I collected it at Chico, in the lower cañons.

S. CAMPESTRIS, Greene, l. c., is either glabrous up to the inflorescence, or with some hirsute hairiness below and cinereous stellular pubescence above; petals over half-inch but rarely full inch long, with emarginate summit usually more laciniate-erose than is common; calyx minutely canescent and with or without

MALVASTRUM and **SPHÆRALCEA**. When the first-named genus was founded, no one supposed that in the principal North American species it came so very near to *Sphæralcea*. Certainly not Mr. Bentham, who in the *Genera Plantarum* placed it in the *Eumalveæ* subtribe. The difficulty in this respect soon became apparent, and was alluded to by Mr. Watson in the *Botany of King's Expedition*, p. 48, and later by Prof. Rothrock in the *Botany of Wheeler's Explorations*. Although the two genera in question are essentially confluent through certain species, they really ought not to be combined under *Sphæralcea*, nor can they be distinguished, as was supposed, by the number of ovules or seeds. The practical course, in my opinion, is to retain in *Malvastrum* the species with cell of the carpels conformed to the solitary ovule and seed, therefore with no empty terminal portion ;

some soft slender hairs, or rarely glabrous ; carpels roughish-rugose or favose-reticulated and commonly pubescent, with rather rounded back and obtuse lateral angles. This is partly *S. Oregana*, Pl. Fendl., and is *Sida malvæflora*, Lindl. Bot. Reg. t. 1036, and Hook. Fl. i. 108. It grows either in moist meadows, where it is smooth, or on dry hills or plains, there more pubescent or hairy ; it is common in the northern (and perhaps also southern) parts of California, and in Oregon and Washington Territory west of the Cascade Mountains. Some forms too nearly approach the next.

S. OREGANA, Gray, Pl. Fendl. l. c., partly. Generally more slender, but commonly tall, merely puberulent, or glabrous up to the simple or paniculate racemes, comparatively small-flowered, the canescent calyx only a third or half inch long and with broadly deltoid lobes ; carpels obscurely rugulose-reticulated, at least on the dorsal angles and sides, the back smooth or smoothish. It is *Sida Oregana*, Nutt. in Torr. & Gray, Fl. Mainly of the dry interior region of Oregon, Washington Territory, and Idaho, but as far west as Portland.

S. GLAUDESCENS, Greene, l. c., is smooth and glabrous up to and even through the inflorescence, yet sometimes with obscure pubescence on the pale or light green foliage ; slender stems seldom over a foot or two high and leaves only an inch or two wide ; racemes loose ; petals quarter to half an inch long, not rarely white ; calyx from glabrous to cinereous-puberulent, the lobes attenuate or acuminate from a broad base ; mature carpels relatively large and thin-walled, turgid, glabrous, with the coarse dorsal reticulations mostly longer than broad, or sometimes smooth and even. This is *S. malvæflora*, Watson, Bot. King Exp. 46, in large part ; also some of E. Hall's no. 71 of Oregon distribution. It abounds in the higher Sierra Nevada, extends east to Utah, and northward apparently even to British Columbia.

= = Mature carpels smooth and even, glabrous or nearly so : flowers mostly small : calyx-lobes deltoid-ovate : hirsute pubescence not rare on stem and petioles, and even on the calyx.

S. NEO-MEXICANA, Gray, Pl. Fendl. 23. *S. malvæflora*, Gray, Pl. Wright. i. 20, mainly (excl. syn.) ; Greene, l. c. Mountains of New Mexico, N. Arizona, and Colorado ; also adjacent Mexico.

and to refer to *Sphæralcea* those with solitary or occasionally two ovules, which when the upper ovule is either abortive or wanting have the upper part, usually the whole upper half, of the mature carpel empty, and of a different texture from the lower part, being thin and smooth, while the lower has rugose-reticulated sides. In these *Pseudo-Malvastrum* species, some of them more commonly bi-ovulate, the mature carpels fall away clean from the receptacle. In the true *Sphæralcea* they usually, after separation from the axis and dehiscence, remain (as in some other genera) for some time attached by a thread passing from the receptacle to the dorsal base of each carpel, which at length tears away, sometimes from the receptacle, sometimes from the back of the carpel.

Our species of *Malvastrum* and of *Sphæralcea* are difficult, and have been not a little confused. I understand them as presented below.†

S. SPICATA, Greene, l. c. Differs from the preceding (perhaps not constantly) in the dense and oblong or interrupted spike of flowers, their pedicels shorter than the rather large calyx or hardly any. This is, as Professor Greene supposed, the *Callirrhoe spicata* of Regel in his Gartenflora. We have seen it in the gardens under the name of *Sidalcea Murrayana*, apparently an unpublished name. It occurs on both the eastern and western sides of the Sierra Nevada, where it was long ago collected by Anderson and by Torrey; recently Prof. Henderson found it in Grant Pass, on the borders of Oregon.

* * Phalanges crowded at the summit of the column and indistinct, most of the stamens being separate, the outermost combined more or less at base in threes or fours: scapose: radical and subradical leaves all pedately dissected.

S. PEDATA. A rather low species, with ascending scapes or scape-like stems and pedately 5-7-parted leaves rising from a tuberous-thickened root; petals (only 4 or 5 lines long) rose-purple; and carpels quite smooth and glabrous. — Bear Valley in the San Bernardino Mountains, S. California, collected by my valued correspondent, S. B. Parish.

† MALVASTRUM, Gray.

* Peduncles, at least the earlier ones, long and slender, one-flowered: calyx involuclate by 3 slender bracts: petals rose-color varying to white: carpels orbicular, rugose, muticous: annuals, not canescent nor tomentose. Arizona-Californian.

M. ROTUNDFOLIUM, Gray, Proc. Am. Acad. viii. 333.

M. EXILE, Gray, Bot. Ives Colorado Exp. 8, & Proc. l. c.

Of a different group, with pedunculate clusters at length evolute into unilateral spikes, similar rugose carpels, and rose-purple petals, is *M. Peruvianum*, Gray, in Bot. Wilkes Ex. Exped., a Mexican form of which, weak and straggling, is *M. jacens*, Watson, Proc. Am. Acad. xxi. 417.

* * Peduncles or pedicels short or hardly any: petals yellow: pubescence appressed or dense,

MELIPHLEA, Zucc. Pl. Nov. fasc. ii. 51, t. 9, is a good genus, upon the characters assigned by its founder, except that the coalition

+ Not canescent, of 2-4-rayed or some simple hairs, on the stems strigose: calyx involuclate.

++ Annual, narrow-leaved, comparatively northern.

M. ANGUSTUM, Gray, Pl. Fendl. 22, & Man. 101. Although this is *Sida hispida*, Hook. Jour. Bot. i. 198 (from St. Louis), it can hardly be Pursh's plant, said to have been collected in Georgia by Lyon, nor Elliott's plant of that name. Yet it is possible, for *M. angustum* occurs as far east as Nashville, Tennessee, and Lyon's explorations extended to the eastern border of that State.

++ ++ Suffrutescent perennials or in their most northern range becoming annual: broader-leaved, tropical or subtropical species.

M. RUGELII, Watson, Proc. Am. Acad. xvii. 367. Probably introduced rather than truly indigenous to S. Florida, where, however, it has thrice been collected; namely, by Rugel, in specimens distributed by Shuttleworth as *Malva Americana*, L., var.; by Garber; and later by Curtiss, in whose distribution it is named *Melochia serrata*. It is without doubt the *Malva scoparia*, Jacq. Collect. i. 59 & Ic. Rar. t. 39, said to come from San Domingo, but not the plant of L'Heritier. Discerning this, it was named *M. corchorifolia*, Desrousseaux in Lam. Dict. iii. 755, an excellent specific name, which should have been adopted; but Mr. Watson overlooked it on account of De Candolle's reference of it as a synonym to *M. scabra*. To go back to that now would be making a superfluous new name. We possess no W. Indian specimens, but they are probably extant in the large herbaria. The carpels are mucous, or with a mere vestige of a subapical cusp.

M. TRICUSPIDATUM, Gray, Pl. Wright. i. 16, & Bot. Wilkes Ex. Exped., where the synonymy is detailed. The wholly strigose (mainly Malpighiaceae) pubescence, and the subapical and two dorsal cusps of the carpels, are characteristic.

M. SCABRUM, Gray in Bot. Wilkes Ex. Exped. (excl. syn. *Malva scoparia*, Jacq. Ic. Rar., which is *M. corchorifolia*, Desrous.), comes between this and the next. It is not North American, but Dr. Palmer collected it in Mexico, it being the *M. tricuspidatum*, var. *bicuspidatum*, Watson, Proc. Am. Acad. xxi. 417. The absence of the subapical cusp to the carpels is one of its characteristics; the pubescence, although roughish, is not strigose-appressed in the way of *M. tricuspidatum*, but more stellate, and the leaves are more cuneate at base.

+ + Subcanescent with close and minute stellate pubescence, no strigose pubescence on the stems; otherwise like the last preceding species.

M. SCOPARIUM, Gray in Bot. Wilkes Ex. Exped., l. c. *Malva scoparia*, L'Her. Stirp. t. 27. Flowers sessile or nearly so in the axils and barely subsapiculate at end of branches: calyx canescent and lobes blunt: carpels 2-tuberculate on the back, but no subapical cusp. Collected in Mexico by Berlandier and Gregg, and within the U. S. in Arizona near Tucson by Pringle, distributed as *M. tricuspidatum*.

M. SPICATUM, Gray, Pl. Fendl. 22. *Malva spicata*, L. Spec. ed. 2; also *M. Americana*, L. Spec. ed. 1, at least the plant of Breyn. Cent. 124, t. 57, on which that species seems wholly to rest. *M. spicata*, *ovata*, and *polystachya*, Cav. An unmistakable species, not known within the U. S., but collected by Berlandier at Matamoros on the Mexican side of the Rio Grande.

of the bracts of the involucl is inconstant and of no account. The large and thin mellifluous disk, wholly adnate to the calyx-tube, is well

- + + + Cinereous with lepidote-stellular pubescence, perennial, with foliaceous-involucellate flowers solitary and subsessile in upper axils, and with rather large deep yellow petals: carpels coriaceous, smooth, hirsute at top, there dorsally bigibbous and ventrally subulate-pointed.

M. WRIGHTII, Gray, Pl. Fendl. 21, Pl. Lindh. ii. 160, & Gen. III. ii. 60, t. 131. *Malva aurantiaca*, Scheele in Linnæa, xxi. 469, therefore *Malvastrum aurantiacum*, Walp. Ann. ii. 153. Texas.

- * * * Peduncles or pedicels short: petals scarlet, copper-color, or rose-color: carpels wholly pointless: involucl of slender deciduous bracts or hardly any. Western perennials, some shrubby, canescent or tomentose with many-rayed stellular pubescence.

- + Pubescence wholly lepidote and silvery, i. e. of peltate scales rather than hairs: leaves very narrow: carpels coarsely reticulated on the sides.

M. LEPTOPHYLLUM, Gray, Pl. Wright. i. 17, ii. 20. S. W. Texas to S. Utah.

- + + Canescent-tomentose with short pubescence, but calyx, &c., hirsute: mature carpels thin-walled, promptly 2-valved, smooth, suborbicular: flowers said to be rose-color.

M. PALMERI, Watson, Proc. Am. Acad. xii. 250, Bot. Calif. ii. 437. Has rather large long-petioled leaves, and a few rather large flowers in a capitate cluster at summit of a terminal peduncle. Collected only by Dr. Palmer near San Luis Obispo, California.

M. DENSIFLORUM, Watson, Proc. Am. Acad. xviii. 368. Has numerous rather small flowers crowded in sessile heads, forming an interrupted spike. S. California, Parish, Nevin.

- + + + Throughout densely stellate-tomentose, no hirsute hairs on calyx: carpels thin-walled, smooth, promptly 2-valved, oval with excised insertion: leaves thickish, obscurely lobed: calyx-lobes long-acuminate: petals rose-color.

M. MARRUBIODES, Durand & Hilgard, in Jour. Acad. Philad. ser. 2, iii. 38, & Pacif. R. Rep. v. 6, t. 2. *M. foliosum*, Watson, Proc. Am. Acad. xx. 356. Orcutt collects this in the northern part of Lower California; with a var. PANICULATUM, having copious and loosely paniculate flowers, some of them rather slender-pedicelled.

M. FREMONTI, Torr. in Pl. Fendl. 21. Throughout very densely soft-tomentose, and calyx most densely woolly; the plant so much resembling *Sphaeralcea Lindheimeri* of Texas, that in Bot. Calif. i. 86 it was mistaken for that. This is wholly Californian, from Calaveras Co. southward.

- + + + + Both herbage and calyx canescent with close and fine almost scurfy stellular pubescence, no hispid or hirsute hairiness.

- ++ Frutescent or truly shrubby, 3 to 15 feet high: leaves barely lobed: mature carpels smooth, glabrate, thin-walled, 2-valved: petals rose-purple.

M. THURBERI, Gray, Pl. Thurb. 307; Bot. Calif. i. 85. *Malva fasciculata*, Nutt. in Torr. & Gray. Has sessile or short-peduncled flower-clusters, spicately or paniculately disposed on virgate and nearly naked branches: is common in Califor-

marked, and the clavate-introrse stigmas help out the character. *M. vitifolia*, Zucc., is the same as *Malva umbellata*, Cav. Ic. 95.

nia from Monterey southward near the coast, and extends into Arizona and S. Utah. Passes into var. *LAXIFLORUM*, with somewhat loosely paniculate flowers, which is *M. splendidum*, Kellogg, Proc. Am. Acad. i. 65; Brewer & Watson, Bot. Calif. 185, where wrong carpels are described by an accident.

→ → Herbaceous, low, with pedately parted or dissected leaves: carpels round-reniform, tomentulose-pubescent, rugose-reticulated, tardily and incompletely dehiscent: petals copper-red.

M. COCCINEUM, Gray, Pl. Fendl. 21, 24 (partly), Pl. Wright. i. 17 (with var. *DISSECTUM*, *Sida dissecta*, Nutt., which is only a most narrow-leaved form), & Gen. Ill. ii. t. 121. The most eastward species, extending even to Iowa.

SPHÆRALCEA, St. Hil. char. auct.

According to the view now adopted, the following are the North American species. Some of them are not easy to be defined and probably run together.

* *Malvastriform* species, with more or less depressed fruit: carpels 1-2-ovulate, the upper ovule when present abortive or seldom maturing, at maturity more or less reniform, at length directly deciduous from the axis (no retaining thread): lower and commonly only seminiferous portion strongly and firmly reticulated over the thin or diaphanous sides; upper and usually empty part smooth and commonly thin, bivalvular or introrse-dehiscent from the top: perennial herbs, except perhaps the first species, which is indeed ambiguous between this and the preceding genus.

→ Root simple, perhaps a winter annual: mature carpel with the scarious empty summit short and inflexed, thus round-reniform in outline: petals orange-scarlet: stellular pubescence rather loose: leaves roundish-subcordate, slightly or moderately lobed and incised.

S. COULTERI. *S. Fendleri*, partly, Torr. Bot. Mex. Bound. 29. *Malvastrum Coulteri*, Watson, Proc. Am. Acad. xi. 125, & Bot. Calif. i. 85, but no internal projection in carpel detected. W. Arizona, first coll. by Coulter, then by Schott, Lemmon, &c. I collected it at Maricopa in the early spring of 1865.

→ → Perennials, mostly lignescens-rooted: carpels less reniform; the smooth upper half or more being moderately incurved or erect.

→ → Leaves all or mainly palmately or pedately parted: mature carpels very blunt: petals brick-red or orange-scarlet: species with great resemblance to *Malvastrum coccineum*.

S. PEDATIFIDA, Gray. *Malvastrum pedatifidum*, Gray, Pl. Lindh. ii. 160, & Pl. Wright. i. 17, ii. 20. *Sidalcea Atacosa*, Buckley, Proc. Acad. Philad. On the Rio Grande from El Paso downward, also San Antonio, Texas.

S. PEDATA, Torr. in Pl. Wright. i. 17, name only. *Sida grossulariæfolia*, Hook. & Arn. Bot. Beech. 326, therefore *Malvastrum grossulariæfolium*, Gray, Pl. Fendl. 21. *M. coccineum*, Gray, Pl. Fendl. 21, partly (no. 21 *Fendleri*), & Pl. Wright. i. 16. *M. coccineum*, var. *grossulariæfolium* (and some *Sphæralcea Emoryi*), Watson, Bot. King Exp. 47. *Malva Creeana*, Graham in Bot. Mag. t. 3698, probably came from this, perhaps is a hybrid. Extends from W. Texas to S. Arizona and N. W.

MODIOLA, Mœnch, with a partition between the two seeds and a habit of its own, will of course be kept up.

Nevada. Passes into var. *ANGUSTILOBA*, with very narrow divisions to leaves, the *Malvastrum coccineum*, var., Gray, Pl. Wright. i. 17.

++ ++ Leaves undivided, at most obtusely 3-5-lobed, of roundish outline, mostly cordate.

= Canescent throughout with short and close stellular pubescence, no loose woolliness: carpels wholly pointless.

S. MUNROANA, Spach. *Mulva Munroana*, Dougl. in Lindl. Bot. Reg. t. 1306. *Nuttallia Munroana*, Nutt. in Jour. Acad. Philad. vii. 16. *Malvastrum Munroanum*, Gray, Pl. Fendl. 21, excl. syn. Chiefly of the northern interior region from the British boundary to Nevada, Utah, and probably Arizona, where with lobed leaves it comes very near the preceding. The flowers are brick-red, I believe, though the published figures make them rose-red, and the calyx is short, not surpassing the depressed small fruit.

S. AMBIGUA. *S. Emoryi*, Torr. in Ives Colorado Exp. Bot. 8; Watson, Bot. Calif. l. c., partly, not Pl. Fendl. nor Pl. Wright. Less leafy than the preceding, more tomentulose, with commonly thicker and merely crenulate-toothed leaves, more naked and racemiform inflorescence; petals rose-color varying to white, half-inch to inch long; calyx 4 to 6 lines long, with acute or acuminate lobes surpassing the moderately depressed fruit, the carpels of which are commonly 3 lines long, very like those of *S. Munroana*, but larger, quite unlike those of *S. Emoryi*, Torr., with which some forms have been confounded. It seems to be abundant over the arid plains of Arizona and Nevada; also coll. in S. California by Thurber, Nevin, Cleveland, &c.

S. SULPHUREA, Watson, Proc. Am. Acad. xi. 125, is a peculiar species of the Lower Californian Islands, with rather the habit of the original *S. cisplatina*, St. Hil. It is said to have pale yellow flowers.

= = Densely pannose-tomentose and calyx very woolly: corolla rose-red: ovules often 3: carpels when mature much constricted in the middle.

S. LINDHEIMERI, Gray, Pl. Lindh. ii. 162. S. Texas and adjacent Mexico.

++ ++ ++ Leaves undivided, of oblong-lanceolate outline, not rarely subhastately 3-lobed: pubescence close and canescent: petals orange-red: mature carpels ovate, with deep reniform excision, tipped with a small and deciduous cusp, often 2-seeded.

S. HASTULATA, Gray, Pl. Wright. i. 17, ii. 21. S. Texas and adjacent New Mexico and Mexico.

* * True *Sphaeralceae*, with fruit less or not at all depressed: carpels 2-3-ovulate, 1-3-seeded, mostly oblong and with some ventral excision, disposed to dorsal as well as ventral dehiscence, when separating from the axis cohering by their sides and at base held by a kind of thread which at length either tears away from the back of the carpel or else is carried away with it: perennial herbs.

← Carpels canescent or glabrate on the back: leaves not Maple-like,

++ Lanceolate to linear, not lobed, rarely even incised.

S. ANGUSTIFOLIA, Spach, l. c. The genuine species, with wholly pointless carpels having rounded summit and smooth or obscurely rugose sides, is wholly

SIDA, L. Bentham has well indicated the conniving or erect tips or points (when there are any) of the carpels for a good character of

Mexican. The corolla is said by Cavanilles to be violaceous, and the colored figures approach to that hue. On tickets the record is commonly "rose-color." As Watson states, in Proc. Am. Acad. xvii. 331, striking as the difference is, one cannot specifically separate the following.

Var. CUSPIDATA. Mostly smaller-leaved and smaller-flowered; petals "red"; carpels narrower, tipped with an erect cusp, which sometimes persists and becomes even a line long, sometimes is reduced to a mucronate point, the short basal portion either slightly or strongly rugose-reticulated on the sides. — *S. stellata*, Torr. & Gray, Fl. i. 228. *Sida stellata*, Torr. Ann. Lyc. N. Y. ii. 171. Texas to Arizona and S. Colorado; also Mexico.

++ ++ Leaves of oblong or roundish outline and often cordate, mostly 3-5-lobed, sometimes dissected: cusps of the carpels more or less extrorse.

= Leaves thickish, rugose and undulate: fruit depressed: carpels not at all rugose-reticulated: calyx mostly half an inch long, and brick-red petals longer.

S. EMORYI, Torr. in Gray, Pl. Fendl. 23, & Pl. Wright. i. 21, only partly of later authorities. Thus far known only from Arizona, on the Gila, coll. by Emory and by Parry, and from Chihuahua, Mexico, by Gregg and Thurber.

= = Leaves thinner, not rugose: fruit higher than wide, the carpels more or less reticulated on the sides.

a. More or less canescent, or stellular-pubescent: species perhaps confluent, certainly variable.

S. FENDLERI, Gray, Pl. Wright. i. 21, ii. 21. *S. miniata*, Gray, Pl. Fendl. 19, & Gen. Ill. ii. 70, t. 127, not Spach. Mountains of W. Texas to Arizona and northern part of New Mexico. Here also seem to belong some forms which have been variously referred to *S. incana*. The leaves are generally green or greenish, or only lower face canescent, and their outline ovate-oblong or sub-hastate, incised or lobed but not dissected; carpels prominently cuspidate.

S. INCANA, Torr. in Gray, Pl. Fendl. 23, & Pl. Wright. i. 21. Common in New Mexico, Arizona, and adjacent Mexico. Passes into var. DISSECTA, Gray, Pl. Wright. l. c., a form with small deeply 3-5-cleft or parted leaves, the divisions and lobes commonly narrow.

S. WRIGHTII, Gray, Pl. Wright. ii. 21, from N. E. Chihuahua not far below the U. S. boundary, has not since been collected; it is probably a good species.

b. Leaves wholly green, small, rather finely dissected, obscurely pubescent, or with the slender stems glabrous.

S. RUSBYI. This I know only from a specimen (no. 537) collected by Dr. Rusby near Prescott, Arizona, and belonging to the Torrey herbarium. The stems are spicately or racemosely few-several-flowered; lobes of the leaves linear or nearly so; petals red, not over a third of an inch long; calyx loosely and subcanescently pubescent, the ovate lobes barely equalling the hemispherical fruit; oblong carpels barely mucronulate, and sides at base obsoletely rugulose.

Sida, as distinguished from *Anoda*, &c. To the peculiar sections named in Pl. Fendlerianæ, viz. *Pseudo-Malvastrum* (the N. American species of which are *S. hederacea*, *S. lepidota*, and *S. cuneifolia*, Gray) and *Pseudo-Napæa*, a third may be added, CALYXHYMENIA, for species which have the ebracteolate calyx much accrescent around or under the fruit, and membranaceous or scarious, — the name taken from *S. calyxhymenia*, Gay, of Australia, and the section therefore including the *Fleischeria* of Steudel and Steetz. Our species, *S. physocalyx*, Gray, Pl. Lindh. ii. 163, in which the 5-parted and angulate-bladdery fruiting calyx imitates that of *Nicandra*, has rather peculiar and very thin-walled reticulated indehiscent carpels with a beak-like apex. The homonymous *S. physocalyx* of F. Müller, from Australia, is much later, and will find another name. Our species of the section *Malvindu* appear to be as follows. †

+ + Carpels hirsute or hispid on the back: leaves Maple-shaped, comparatively large and with acute serrate lobes: tall herbs, green or at least not canescent.

S. ACERIFOLIA, Nutt. in Torr. & Gray, Fl. i. 228. *S. rivularis*, Torr. in Pl. Fendl. 23. *Malva rivularis*, Dougl. British Columbia to Rocky Mountains, Dakota, and at a single station in Illinois.

S. LEPTOSEPALA, Torr. Bot. Wilkes Ex. Exped. Washington Territory on the Upper Columbia, coll. by Pickering and Brackenridge, and recently by Tweedy and Brandegee. Well marked by the slender peduncles and caudate-attenuate calyx-lobes.

† SIDA, § MALVINDA.

1. Species with a somewhat *Stylosanthoid* habit; the sessile or short-peduncled flowers mainly at the summit of the low stems or branches and involucre by petioled leaves: petals reddish-purple.

S. CILIARIS, L. Reaches Florida, and includes *S. involucrata*, A. Richard, and *S. anomala*, St. Hil.

Var. FASCICULATA, the narrow-leaved Texan and Mexican form of the species. *S. fasciculata*, Torr. & Gray. *S. anomala*, var. *Mexicana*, Moricand, which appears to be likewise *S. muricata*, Cav. Ic. vi. 78, t. 597. *Malvastrum linearifolium*, Buckley, Proc. Acad. Philad. 1861, 449, is the same.

2. Species with flowers not involucre, either solitary or clustered in most of the axils, or barely paniculate at the summit: calyx 5-angled, and petals mostly yellow.

* Stems diffusely decumbent or prostrate and filiform: petioles and peduncles long and slender: leaves somewhat cordate, small.

S. DIFFUSA, HBK., with hardly a doubt, although the flowers are not "violet," nor the fruit depressed at summit. *S. filiformis*, Moricand, and *S. filicaulis*, Torr. & Gray. Texan, Arizonian, and Mexican.

S. SUPINA, L'Her. W. Indian and on the Florida Keys.

ABUTILASTRUM is a name quite appropriate for another section, namely for *Sida Lindeniana*, which would be essentially an *Abutilon* of the section *Gayoides* except for the uniovulate carpels.

BASTARDIA, HBK. The wide-spread *B. viscosa*, HBK., seems not to be recorded from the eastern parts of Mexico. It is no. 748 and 2168 of Berlandier's collection, made between Tula and Tampico. There is also the following apparently very distinct and undescribed species.

BASTARDIA BERLANDIERI. Ut videtur elata et basi frutescens, patenti-ramosa, pube minuta subcinerea, secus ramulos glandulosa; foliis lato-cordatis cum acumine obtuso sinu sæpius clauso (caulinis 4-5-pollicaribus); pedunculis flore brevioribus; calycis lobis ovatis subito

* * Stem erect: leaves rather long-petioled and nearly all cordate or subcordate; flowers not long-peduncled: carpels 10-12, bi-mucronate or 2-awned.

S. CORDIFOLIA, L. Reaches the Florida Keys.

S. TRAGIÆFOLIA, Gray, Pl. Lindh. ii. 164. Raised from Wright's seeds supposed to have been gathered in Texas, but probably in S. Arizona, as we now have a form apparently of this species; but leaves less cordate, smaller, and more cinereous, from Arizona, collected by Pringle and by Lemmon; and Palmer brought from Coahuila specimens connecting these with the type.

* * * Stems erect and branching: leaves slender-petioled and truncate-obtuse or retuse at base, from ovate-oblong to linear: a small tubercle under the base of the petiole (but this occasionally obsolete): flowers small and nearly all short-peduncled: carpels mostly 5. Species probably not indigenous, even on our southern borders.

S. SPINOSA, L., with comparatively broad and green leaves.

S. ANGUSTIFOLIA, Lam., with linear or at least narrow and canescent leaves, is doubtfully distinct. It is Engelmann's *S. heterocarpa*.

* * * Stems erect: leaves mainly short-petioled or subsessile, acute or obtuse at base but never cordate, usually destitute of tubercle under the petiole, but this sometimes apparent in *S. rhombifolia*: carpels 8 to 12.

+ Leaves cuneate-obovate or oblong-obovate to lanceolate, green, at most cinereous puberulent: stems branching, leafy to the top: annuals in the U. S., probably incomers from Tropical America.

S. RHOMBIFOLIA, L., with var. CANARIENSIS, Griseb. The genuine plant known by the single subulate awn to the carpels.

S. CARPINIFOLIA, L. An equally variable species; includes *S. acuta*, Burm., *S. stipulata*, Cav., *S. glabra*, Nutt., &c.

+ + Leaves mainly linear or linear-lanceolate and obtuse at both ends: carpels bicuspidate or bimucronate just behind an inflexed short apex, or muticous: indigenous perennials.

S. ELLIOTTII, Torr. & Gray, is a completely glabrous species; with some peduncles or pedicels little shorter than the subtending leaf, but many shorter than

caudato-acuminatis capsulam depressam 5-lobam æquantibus; carpellis obtusis arista tenui molli per dehiscentiam loculicidam bisecta apiculatis; semine pubescente. — Tantoyuca, Mexico, *Berlandier*, 747, 2167.

GAYA, HBK. By some oversight, Hemsley, in the Biol. Centr.-Am. Bot. i. 102, has named Parry & Palmer's no. 92 "*Gaya subtriloba*." It is the common *Abutilon crispum*.

HORSFORDIA, Nov. Gen. inter *Sphæralceam* et *Abutilon*. Calyx basi nudus. Carpella 8-12, coalita, tarde secedentia, 3-ovulata, 1-3-sperma (ovulis 2 superioribus sæpe abortientibus, infimo resupinato-pendulo), matura difformia; pars superior sæpius vacua mox accrescens, membranaceo-scariosa, et bipartita in alas 2 parte infima firmiore grosse reticulata (modo *Sphæralcearum* plurimarum) 2-3-plo longior. Discus

the calyx, even the long ones not articulated except with the insertion. As far as can be seen, the imperfect specimens from Key West referred by Chapman to *S. Lindheimeri* belong here.

S. NEO-MEXICANA. A span to a foot high, diffusely many-stemmed from a ligneous base or root, minutely puberulent, not cinereous: peduncles not articulated, all short or very short: petals orange-yellow often changing to red: mature carpels muticous or barely mucronulate. — *S. Elliottii*, var.? Gray, Pl. Wright. ii. 21. *S. rhombifolia*, var.? *microphylla*, Hemsl. Bot. Biol. Centr.-Am. i. 106, small-leaved form. Eastern part of New Mexico, *Wright*, *Thurber*, *Greene*, &c. S. Arizona, *Lemmon*. Chihuahua, *Pringle*. San Luis Potosi, *Schaffner*, *Parry* & *Palmer*.

S. LINDHEIMERI, Engelm. & Gray, Pl. Lindh. i. 5. *S. Elliottii*, with var. *Texana*, Torr. & Gray, Fl. i. 681, not of 231. Cinereous-puberulent, at least the lower face of the leaves: slender peduncles about equalling the leaves, articulated above the middle: petals yellow: carpels bicuspidate. Texas, extending into adjacent Louisiana and adjacent Mexico; first coll. by *Berlandier*.

S. LONGIPES, Gray, Pl. Wright. i. 19; name several years prior in publication to *S. longipes*, E. Meyer in the Flora Capensis. Well marked by its very long and strict peduncles, with articulation a little below the summit, and muticous carpels. It is wholly S. W. Texan.

An outlying species, not quite of this group, is the following.

S. XANTI. A foot or two high, woody below, scabro-puberulent: lowest leaves ovate or subcordate and slender-petioled; upper lanceolate; all an inch or less long, dentate; uppermost small: peduncles surpassing the leaves, articulated toward the summit: petals apparently white but perhaps yellow, almost an inch long: carpels about 10, rugose and glabrate at maturity, bimucronulate, the interior apex not inflexed. — *S. Elliottii*, var.? Gray, Proc. Am. Acad. v. 154. Cape San Lucas, Lower California, *Xantus*.

3. Species with calyx not at all angled: flowers in ours long-peduncled, and petals violet.

S. FILIPES, Gray, Pl. Lindh. ii. 164, Pl. Wright. i. 19. Texan and Mexican; of the *S. paniculata* group.

sub fructu vix ullus. Semen *Abutili*. — Frutices vel herbæ frutescentes, Crotoniformes, tomento albido stellulato denso scaberulo; foliis ovato-cordatis oblongisque; pedunculis axillaribus unifloris.

H. ALATA. Frutescens; petalis purpureis roseisve semipollicaribus calyce triplo longioribus; carpellis 10–12 monospermis (ovulis 2 superioribus abortivis); parte superiori vacua ante maturitatem bipartita et in alas 2 angusto-oblongas erectas scariosas parte seminifera reticulata triplo longiores mutata. — *Sida alata*, Watson, Proc. Am. Acad. xx. 356. N. W. Sonora, Mexico, about 100 miles below the U. S. boundary, *Pringle*. — It is most proper that one of the new plants which Mr. Pringle collected at much risk of life, in the northwestern corner of Sonora, should commemorate his able associate in practical botanical labors, *Frederick Hinsdale Horsford*, of Charlotte, Vermont. Having a second species to add, I may perhaps take leave to join the name of my own former associate, *Eben N. Horsford*, of Cambridge, the well-known chemist, whose services and gifts to the scientific department of Wellesley College will more worthily immortalize his memory. The second species is

H. NEWBERRYI. Fruticosa; petalis (ut dicitur) læte flavis dimidio minoribus; carpellis 8–9, di-trispermis, parte superiori scarioso-membranacea brevior latiore subdivergente; foliis inferioribus magis cordatis. — *Sphæralcea crotonoides*, Torr. in herb. *Abutilon Newberryi*, Watson, Proc. Am. Acad. xi. 125, & Bot. Calif. i. 87. — Arizona, on the Gila, &c., *Emory*, *Newberry*, *Parry*, and adjacent borders of California, *Parish*; also adjacent parts of Sonora, Mexico, *Pringle*, and of Lower California, *Palmer*, *Orcutt*.

ANODA, Cav. A critical examination brings to light carpological differences among the species of this genus which had only partially been detected before, and had not been worked out. The subjoined arrangement of the forms known to me will exhibit these points of structure, and to a certain extent set right the nomenclature of at least the North American species.†

† ANODA, Cav.

§ 1. EVANODA. Seed and ovule horizontal or nearly so in the mostly beaked carpels of the much depressed and radiatiform fruit, naked, or in one species with an arilliform pellicular fragile coating, the disk or upper face of the fruit strongly hispid or hirsute.

* Corolla violet or purple, varying occasionally to white: fruit mostly surpassed by the widely spreading calyx, the top beset by scattered simple bristles:

ABUTILON, Tourn. The Mexican species need to be cleared up before we can well settle those of the North American flora. For this sufficient authentic materials are not at hand.

herbage destitute of stellular, but commonly with some hispid pubescence: slender peduncles nearly all in axil of leaves.

A. HASTATA, Cav. Carpels 15 to 20, rather conspicuously beaked; the dorso-basal portion wholly thin-scarious and veinless, with slender midnerve, the sides or partitions completely obliterated at dehiscence: seed quite naked. — *A. hastata*, *triloba*, & *Dilleniana*, Cav. Diss. t. 10, 11. *A. cristata* & *A. hastata*, Schlecht. in *Linnaea*, xi. 210, 214. *Sida cristata*, L. *S. cristata*, *hastata*, & *Dilleniana*, Willd. — These I take to be all of one species, of which the larger-flowered forms, with petals about an inch long, are known only in cultivation. The typical *A. hastata*, with upper leaves truly hastate or deltoid, and which comes north to Texas and Arizona, has petals only half an inch, and in a depauperate form only a quarter of an inch long. I find the character of the fruit invariable. And this character of the fruit, as verified from the specimen in the Candolleian herbarium, also refers here *A. triangularis*, DC. Prodr. i. 459. — Var. *depauperata* (Gray, Pl. Wright. ii. 23) is nothing more than a slender and very small-flowered form.

A. ACERIFOLIA, DC. Prodr. i. 459. Closely resembling *A. hastata* and with leaves similarly varying: carpels short-beaked or sometimes nearly pointless, the sides completely obliterated at dehiscence, the basal part of the dorsal portion thin-scarious as in the preceding, but the whole gibbous upper part thicker and with strong and coarse reticulations, in age bilamellar, its endocarpial portion (half embracing the seed) becoming coriaceous and clathrate. — *S. hastata*, Sims, Bot. Mag. t. 1541? ex DC., probably correctly so referred. *Sida deltoidea*, Hornem. Hort. Hafn. 650, is perhaps the same; perhaps also *A. brachyantha*, Reichenb.; but Schlechtendal, in his annotations on this genus, makes no mention of the neat and really decisive characters which distinguish the species. From the appended observations, *A. hastata*, A. Rich. Fl. Cub. 149, must be of the present species. My Mexican specimens are, one from Acapulco (*A. hastata*, Hook. & Arn. Bot. Beech. 411, at least in part), and from Batopolas in Chihuahua, Palmer, 234 (these with mainly hastate and short-petioled leaves and hardly any cusp to the carpels); and from Orizaba, Botteri, 1135, with subcordate or deltoid leaves and distinctly cuspidate carpels. No. 86 of Fendler's Venezuela collection is similar. This has some Maple-shaped leaves.

A. ARIZONICA. Slender, a foot or two high, with sparse and few hirsute hairs, otherwise nearly glabrous, small-flowered: petals 3 lines long: leaves and also the fruit (of 8 to 11 conspicuously beaked carpels) like those of *A. hastata*, var. *depauperata*, but seed invested more or less completely by a very thin and fragile veinless pellicular coating, which is probably of carpellary origin. — S. Arizona, Lemmon, 599. Leaves cordate, deltoid-ovate, or uppermost hastate.

Var. **DIGITATA**. Leaves mostly hastate-digitate, the prolonged middle lobe narrowly lancéolate or linear, and the two lobes on each side linear and half shorter. — S. Arizona, Lemmon, 517 of coll. 1881.

* * Corolla yellow: calyx shorter-lobed, and less explanate under the densely and stellately hirsute fruit, which it hardly surpasses; upper flowers naked-

Besides *A. AVICENNÆ*, which is more or less naturalized in the Atlantic States, I count *A. INDICUM*, var. *HIRTUM*, of Grisebach, as a chance introduction from the West Indies into the southern parts of

racemose: pubescence minute and stellate and above with some simple soft-hirsute hairs, viscidulous.

A. LANCEOLATA, Hook. & Arn. Bot. Beech. 411, from the western side of Mexico, is nearly related to the following. It has the back of the mature carpels similarly but more delicately clathrate-reticulate, the epidermal epicarp apparently not separating, seed hispidulous-scarious, and petals 9 lines long.

A. WRIGHTII, Gray, Pl. Wright. ii. 22. New Mexico, Wright; Mexico, Schaffner. This, having been received from the Berlin Botanic Garden under the name of *A. parviflora*, was taken for that species in Watson's Bibl. Index, and in Proc. Am. Acad. xvii. 330; but it will be shown that it is not the plant of Cavanilles. The dorsal portion of the 8 to 10 carpels is bilamellar at maturity, the endocarpial layer is not unlike that of *A. triangularis*, but larger and more clathrate-reticulate, loosely half enveloping the barely puberulent seed.

§ 2. *SIDANODA*. Seed more or less suspended in the 5 to 10 barely umbonate merely puberulent carpels of the moderately or hardly depressed fruit, destitute of endocarpial coating: flowers small: pubescence mostly fine and stellate, no bristly hairs.

* Corolla blue to bluish-white: calyx deeply cleft, rotately spreading under the depressed fruit.

A. ACERIFOLIA, DC. Prodr. i. 459. *Sida hastata*, Sims, Bot. Mag. t. 1541. Mexico. If I correctly refer to this species no. 78 of Parry & Palmer's Mexican collection (which has the general aspect of a small-flowered *A. hastata*, except as to pubescence of herbage and fruit), the species is distinguished from the following by the mainly axillary and larger flowers, the petals nearly half an inch long, perfectly glabrous seed, and thinner carpels destitute of nerves. I have seen only immature fruit.

A. THURBERI. Slender, a foot or two high, green and barely puberulent or glabrate below; the calyx, &c., puberulent-canescens: lower leaves cordate and dentate, upper hastate: flowers mostly paniculate-racemose: petals only 2 or 3 lines long: carpels 8 or 9, the whole dorsal and thickish apical portion strongly 3-nerved (or the nerves confluent near the base): seed puberulent. — S. Arizona, *Thurber, Wright, Lemmon*. Chihuahua, Mexico, *Pringle*, 288, distributed as "*A. parviflora*, var.?" To this belongs part of the specimens taken for a depauperate form of *A. hastata*, in Pl. Wright. ii. 28; also the plant referred to in Pl. Thurb. 308.

* * Corolla yellow, sometimes changing to pink in fading: calyx shorter and less deeply cleft, ascending or appressed to and seldom surpassing the little depressed fruit; its carpels (and closely enwrapped seed) nearly vertical, the inflexed apical portion short: plants paniculately branched and racemose-flowered, stellate-pubescent.

A. PENTASCHISTA, Gray, Pl. Wright. ii. 22. Slender, a foot or two high, minutely puberulent and more or less cinereous: lower leaves ovate or subcordate, somewhat 3-lobed; upper hastate or lanceolate, uppermost linear: calyx 2 lines

Florida; and am disposed to think the same of *A. PEDUNCULARE*, HBK., or what passes for that species.

A. JACQUINI, Don, (*Lavatera Americana*, L., *Sida abutiloides*, Jacq. Obs. t. 7, *S. crassifolia*, L'Her. Stirp. t. 60, *Abutilon lignosum*, A. Rich. Fl. Cub., and Griseb., to which may be added *A. hypoleucum*,

long, little shorter than the yellow corolla: carpels 5, or not rarely 6 to 10, obovate-oval after dehiscence, the sides soon obliterated: seed puberulent. — S. Arizona to Texas, *Wright, Thurber, Havard*.

A. ABUTILOIDES. Taller and stouter, 3 or 4 feet high, canescent, and branches with some loose hairs: leaves all cordate, crenately serrate, caudate-acuminate, uppermost lanceolate: calyx 2 or 3 lines long, the lobes broadly ovate and apiculate: petals 4 or 5 lines long, obovate, yellow changing to pinkish in drying: carpels 5 to 7, when mature 2 lines high and less deep, obscurely umbonate, septicidally separating almost whole, the diaphanous inner walls tardily breaking up and uncasing the puberulent seed, the permanent dorsal portion deep-cymbiform, thin-membranaceous with thicker and firmer summit, disposed to split down the back into two valves. — Santa Catalina Mountains, S. Arizona, *Pringle*, 1882, distributed as "*A. pentaschista*" and as "*Sida Berlandieri*, var."

§ 3. *CLEISTANODA*. Seed (wholly smooth and glabrous) completely and permanently invested by a firm corrugate-reticulate or at length clathrate (doubtless endocarpial) arilliform covering: habit, flowers, and pubescence of § 2.

A. PARVIFLORA, Cav. Ic. v. 19, t. 431. Petals "yellow," but in dried specimens seeming rather to be purplish: radiate summit of fruit hirsute-pubescent, and with short cusps or points; dorsal and permanent portion of carpels comparatively firm in texture with a stout midrib below, or basal part reduced to a very stout rib. — Mexico. Structure of the fruit ascertained from specimens which were cultivated in the Paris Garden in 1814. Also indigenous ones from northern part of Mexico, i. e. in Chihuahua near Batopolas, *Palmer*, and near the city of Chihuahua, *Pringle*.

A. RETICULATA, Watson, Proc. Am. Acad. xvii. 368. This species, in which the arilliform covering of the seed was first discovered by Mr. Watson, has smaller and more lobed leaves, an at length elongated naked raceme of flowers, small and "blue" corolla, and a different fruit from that of *A. parviflora*. The carpels are more erect, wholly muticous, barely puberulent, at maturity with exocarp bivalvular, thus dividing the capsule into 10 narrowly oblong almost membranaceous and barely concave valves, liberating the still attached coarsely reticulated husks, each filled by a seed.

A. CRENATIFLORA, Ort. Dec. viii. 96. Not having this part of Ortega's Decades, I cannot say if Cavanilles rightly referred this species to his *A. parviflora*. If so the name has a year's priority in publication; but the petals being entire, the name may be passed by as false for this species.

A. INCARNATA, HBK. Nov. Gen. & Spec. v. 266, described from a plant cultivated in the Botanic Garden of Mexico, has not been identified and perhaps is not of the genus.

A. PUBESCENS, Schlecht. in Linnæa, xi. 218, from Mineral del Monte, Ehrenberg, is not made out.

Gray, Pl. Wright. i. 20,) cannot be *Sida lignosa*, Cav., with "capsulis durissimis." In Mexico it comes so near the boundary (coll. *Berlandier*, *Palmer*, &c.) that it is likely to reach Texas. It is known by its seemingly cordate sepals equalling the numerous subulately erect-awned and villous-hirsute carpels, which are as large as those of the preceding species.

A. PALMERI, Gray, and *A. AURANTIAECUM*, Watson, are apparently good species of N. W. Mexico and Lower California, which come very near to our borders.

A. PERMOLLE, Don, is the Florida plant (otherwise only West Indian) which in Chapman's Flora is taken for *A. Jacquini*.

A. WRIGHTII, Gray, of Texas, Arizona, and adjacent Mexico, is the species most resembling *A. Jacquini*, Don.

A. PARISHII, Watson, Proc. Am. Acad. xx. 357, is a recently added species of the same group, but wholly herbaceous, with short peduncles and short calyx.

A. LEMMONI, Watson, l. c., is a species near to the Mexican *A. Berlandieri*, Gray, which Mr. Watson has partly characterized; and to the latter may be referred the "306, *Abutilon*" of Pringle's Chihuahua distribution, a var. *DENTATUM*.

A. XANTI is a name which may be applied to the plant of Lower California, noted as "*A. Californicum*, Benth. var." in Proc. Am. Acad. v. 154, which cannot be Bentham's species. It goes with those two very closely related species, *A. Sonoræ*, Gray, and *A. reventum*, Watson, Proc. Am. Acad. xxi. 418, which are herbaceous, large-leaved, and with a very naked and ample compound panicle of small flowers. This one has neither the long beard-like hairs of *A. Sonoræ*, nor the smooth stems of *A. reventum*, and has a different and larger calyx, nearly equalling the cuspidate beaked fruit.

A. MALACUM, Watson, Proc. Am. Acad. xxi. 446, is quite well distinguished from the next by the more glomerate or paniculate flowers, and the longer as well as permanently erect calyx, and generally by the foliage.

A. INCANUM, Don. *A. Texense* & *A. Nuttallii*, Torr. & Gray, Fl. In the Botany of the Wilkes South Pacific Expedition, I noted that *A. incanum* of the Sandwich Islands was hardly distinguishable from *A. Texense*. I now find that the characters there mentioned are of no avail. The seeds of our plant, although quite glabrous when young, become minutely downy in age. We must combine the species, notwithstanding the disjointed range.

A. PARVULUM, Gray, to which belong some specimens which have

been referred to *A. Texense* (as in Lemmon's and Pringle's Arizona collections), ought to be distinguished, not only by the spreading or trailing growth and the pubescence, but also by the color of the corolla. In the original description this is said to be yellow: but I find no authority for it in the collector's memoranda. It is noted as "brick-red" on the ticket of specimens collected by Sir Joseph Hooker and myself at Cañon City, Colorado, in 1877, and as "pink" by Dr. Harvard in specimens from W. Texas.

A. THURBERI, Gray. A pentacarpellary species, of Grisebach's section *Anasida*, but wholly with one-flowered peduncles. Dr. Masters, in Fl. Trop. Africa, i. 186, takes it to be very near *A. ramosum* (*Sida ramosa*, Cav.); but that seems to be more like *A. umbellatum*. The latter was collected by Berlandier in Mexico, not far from the Texan boundary (no. 1549, 3049), is cinereous or somewhat canescent, usually more than pentacarpellary, and the peduncles 3-5-flowered, the seeds muriculate.

A. HOLOSERICEUM, Scheele, which is figured in Gen. Ill. ii. t. 125, as *A. velutinum*, is interesting as the only one of our species which bears a pair of collateral ovules and seeds in the upper part of each of the five carpels, while the lower and narrower basal portion bears a single seed.

A. (GAYOIDES) CRISPUM, Don. Common along the southern frontier, usually with villous branches, while in Florida the var. *imberbe*, Griseb. (*A. trichodum*, A. Rich., and *Sida imberbis*, DC.) prevails. To this species belongs no. 92 of Parry & Palmer's Mexican collection, which has been inadvertently referred to *Gaya subtriloba*.

HIBISCUS, L. Accepting this genus with the limits assigned by Bentham and Hooker, the subgenera, so far as North America is concerned, would seem to be *Euhibiscus*, *Abelmoschus*, and *Paritium*; the first, comprising the bulk of the genus, dividing into more or less well limited sections.

H. (MALVAVISCOIDES) TUBIFLORUS, DC. From the character and the original figure, the outlines of which have been reproduced by Alph. de Candolle, it seems safe to refer to this the *H. Bancroftianus* of Macfadyen, the synonymy of which (excluding *Malvaviscus penduliflorus*) is correctly detailed in Watson's Bibl. Index. To it I refer, as a large-leaved form, no. 643 of Ghiesbreght, the leaves of which are sometimes 3-cleft.

H. LASIOCARPUS, Cav. Diss. iii. 159, t. 70, f. 1. This is the oldest and an appropriate name for the *H. incanus* of Schrader and Wend-

land (of which it is doubtful if the petals are ever sulphur-color), and the *H. grandiflorus* of Michaux. Cavanilles described and figured his species from a specimen in the herbarium of Jussieu, with upper leaves only. Var. *OCCIDENTALIS*, the *H. Moscheutos*? var. *occidentalis*, Torr. in Wilkes Expedition, and *H. Californicus* of Kellogg, which grows on the Sacramento and San Joaquin in California, appears to be a form with less hirsute but yet densely pubescent capsules. An intermediate form was collected by Thurber near Janos, in Chihuahua.

H. MOSCHEUTOS, L. We take it as fairly made out that *H. roseus* is the American species, somehow introduced into the South of Europe.

H. MILITARIS, Cav. To this apparently belongs *H. Carolinianus*, Muhl., and probably of Elliot.

H. TRIONUM, L. To this old-world species of the gardens belongs *H. Collinsiana*, Nutt., as to Nuttall's plant collected by Ware, if a specimen from herb. Collins may be trusted. But in the Torreyan herbarium that species is represented by a leaf or two of *H. Manihot*, and a leaf with two flowers of *H. esculentus*.

H. (PARITIUM) TILIACEUS, L., and *THESPESIA POPULNEA*, Correa, have reached the Keys of Florida, both probably rather denizens than natives.

ORDO CHEIRANTHODENDREÆ.

Calyx *valde quincunciali-imbricatus*, 5-partitus, pl. m. corollinus, persistens. Petala nulla. Stamina 5, ima calyce parum adnata, segmentis ejus alterna, monadelpha: antheræ biloculares, adnatæ, extrorsæ; loculis sat elongatis parallelis longitrorsum dehiscentibus: pollinis granulæ subtrigonæ, læves, reticulatæ. Ovarium 5-loculare, loculis sepalis antepositis: stylus filiformis indivisus, stigmatē minimo indiviso terminatus. Ovula in loculis plurima, horizontalia, anatropa. Semina ovalia, testa crustacea lævi. Embryo in albumine carnosio rectus, eodem paullo brevior: cotyledones ovales, foliaceæ, leviter (*Gordonia* fere modo) subplicatæ, radícula 3-4-plo longiores. — Arbor et frutex, pube stellulata furfuraceo-pubescentes; foliis palmatilobatis alternis, stipulis parvis caducis, pedunculis terminalibus vel oppositifoliis unifloris, floribus sat magnis sub calyce 3-bracteolatis, sepalis basi intus fovea nectarifera instructis.

CHEIRANTHODENDRON, Larreat. Sepala coriaceo-petaloidea, dorso carinata, suberecta. Andrœcium obliquum, hinc altius fissum: antheræ declinatæ, incurvæ, digitiformes, validæ, ultra loculos longolinesares in acumen subulatum productæ. Semen ad chalazam appendice granulata instructa. Sectio transversa cotyledonum ∞ -formis. —

Chiranthodendron, Larreatequi (1795*), Baillon. *Cheirostemon*, Humb. & Bonpl. 1808. — The much older name, which Baillon has restored and which we cannot properly refuse to adopt, is well formed, being the Greek of the native name of the *Hand-flower Tree*. Humboldt and Bonpland deliberately superseded it, merely because they thought they could make a better and shorter name. It is only in the latter respect that they were successful.

FREMONTIA, Torr. Sepala plana, omnino petaloidea, patentissima. Andrœcium regulare: columna æqualiter 5-fida: antheræ oblongo-lineares, utrinque emarginatæ, connectivo tenui haud producto adnatæ, loculis reniforme-incurvatis mox anfractuosus. Semen haud appendiculatum. Cotyledones marginibus leviter homotrope incurvis. — Contrary to the original description and figure, (which also represents an anomalous four-celled ovary, the like of which has not again been met with,) the stamens alternate with the sepals. So they do in the Hand-tree flower, according to Adrien de Jussieu, who communicated a long and faithful description to the *Flore des Serres* (vii. 7–9) in 1851, probably his last botanical writing. Dr. Masters, in *Gard. Chronicle*, 1869, and in *Seemann's Journal of Botany* (vii. 298), with fresh flowers of *Fremontia* in hand, gives the position of the stamens correctly. When he insists, partly on this account, that the showy perianth of *Fremontia* is a corolla, he forgets that in *Sterculiaceæ* and probably all the Malval cohort the stamens, whenever isomerous, stand before the petals or the place for them, i. e. alternate with the sepals; so that this evidence tells the other way. As for the caducous bractlets, which Dr. Masters takes for a reduced calyx, the five which he found is a most unusual number. We find only three, answering to the larger and less deciduous ones of the Hand-tree, and to the bractlets of most *Sterculiaceæ*.

Bentham, adopting a suggestion of Torrey, included these two genera in his tribe or suborder *Bombaceæ* of *Malvaceæ*, describing the stamens as united in pairs with unilocular anthers, which was a forced hypothesis; also the calyx-segments as “leviter imbricatis,” which was no slight diminution of the fact. But in the *addenda et corrigenda* to the first volume of the *Genera Plantarum* (two years earlier than Dr. Masters's note), he changes this view, and transfers his subtribe *Fremontieæ* to *Sterculiaceæ* as a new tribe.

It seems to me better frankly to recognize the peculiarities of these

* With figure, &c., and a French translation, with two plates, published at Paris in 1805.

two genera, of which the leading one is the strongly quincuncial calyx, and not to force them into an order, nor into a cohort, of which a valvate calyx is an essential and substantially an unvaried character. As a small order, it takes a comfortable position between the Guttiferal and Malval cohorts in the Genera Plantarum, connecting the two, and with no technical character alien to the former.

Tiliaceæ.

TILIA. Although our species are not absolutely limited, it seems necessary to restore *T. pubescens* to specific rank, and so to recognize three species, viz. :—

T. AMERICANA, L., with ample leaves essentially glabrous, thickish and firm, green on both faces, the upper lucid; floral bract usually tapering into a stalked base (except the uppermost); fruit ovoid, usually lightly costate.

T. PUBESCENS, Ait., with smaller and mostly thinner leaves, distinctly pubescent beneath, yet often glabrate in age: floral bract usually rounded at base and sessile or hardly stalked: fruit globular. I do not adopt the older name of *T. Caroliniana*, Mill. Dict.; for the original character, as well as that of Marshall and of Wangenheim, points to *T. Americana* rather than to *T. pubescens*. Probably to that species also belongs the *T. pubescens* of the Nouveau Duhamel.—The var. **LEPTOPHYLLA**, Vent., is very well marked by its larger and thin leaves. It is hardly possible to combine this form with *T. Americana*, and its habitat is much more southern.

T. HETEROPHYLLA, Vent., the *T. alba* of Michx., but not of Aiton, is well marked by its ample leaves of ovate outline (not rounded as in the true *T. alba* of S. E. Europe), whitish or silvery beneath; floral bract tapering to a very short-stalked or sessile base, usually elongated, and the peduncles still longer; the fruit globular. It strictly belongs to the Alleghany region, from Southern Pennsylvania to Florida. The original reference of Aiton's *T. alba* to America was corrected in the second edition of the Hortus Kewensis. But, having been copied by Ventenat, under his *T. rotundifolia*, the mistake has been kept up by Bayer in his Monograph, who places it under his *T. heterophylla-nigra*, and has two forms from Kentucky, both undoubtedly *T. heterophylla*.

T. MEXICANA, Schlecht., which Bayer makes a variety of *T. pubescens*, is probably a good species. The floral bracts taper to a slender-stalked base.

Zygophyllaceæ.

TRIBULUS, Tourn. The genera *Kallstrœmia*, Scop., and *Tribulopsis*, R. Br., which there had been some reason for retaining, are now effectually suppressed by finding that *Tribulus Californicus*, Watson, has a deciduous calyx along with a 10-carpellary ovary with uniovulate carpels, but the alternate ones abortive.

GUAIACUM, Plumier. It is noted in Pl. Wright. i. 28, that the position of the cotyledons of *Porlieria hygrometrica* is not uniform, these being sometimes incumbent and sometimes accumbent in respect to the floral axis. They are also incumbent, at least occasionally, in *G. officinale*; and in *G. arboreum* the filaments are more or less squamiferous, while *G. parvifolium* has tetramerous as well as pentamerous flowers; and a nearly related species, *G. Planchoni* (*G. parvifolium*, Planchon in herb. Hook., of which see Pl. Wright. l. c. 29, and of Hemsley as to Andrieux's plant), has naked filaments. It is therefore evident that the genus *Porlieria* cannot be kept up.

2. *Sertum Chihuahuense*: appendix.

The following are new *Gamopetalæ* of Mr. Pringle's collection in the State of Chihuahua, Mexico, in the summer and autumn of 1886.

BOUVARDIA GRACILIS. Undique glabra, ramulosa; ramis gracilibus crebre foliosis; foliis oppositis tenui-membranaceis ovato-lanceolatis brevissime petiolatis (majoribus sesquipollicaribus, ramealibus nunc parvulis), venis tenuibus parvis inconspicuis; floribus paucis brevissime pedicellatis in fasciculo sessilibus; calycis lobis subulatis (lineam longis) tubo in anthesi multo longioribus capsula lævi (lin. 2 longa) brevioribus: corolla glaberrima alba, tubo fere filiformi semipollicari, lobis ovalibus lineam longis. — Mapula Mountains, twenty miles south of Chihuahua, in shade of cliffs.

BRICKELLIA SOLIDAGINIFOLIA. Multicaulis, puberula; caule ultralipedali e caudice perenni herbaceo sursum crebre ramoso, ramis usque ad capitula corymboso-congesta brevi-pedicellata foliosis; foliis plerisque alternis lanceolatis integerrimis basi angusta sessilibus submembranaceis tenuiter venosis (1-2-pollicaribus); involucri 10-floro lin. 3 longo bracteis pauciusculis binervatis acutiusculis, interioribus floribus dimidio brevioribus lineari-lanceolatis, extimis brevibus subovatis;

achenii nervis hispidulo-scabris. — Cool slopes of the Mapula Mountains, twenty miles south of Chihuahua.

SENECIO PRINGLEI. *S. Parryi* peraffinis, pariter viscoso-puberulus, foliosus, subcymoso-pleiocephalus; radice perenni; foliis membranaceis (3–5-pollicaribus) obovatis argute dentatis pinnatifido-incisisque in petiolum alatum basi auriculatum semiamplexicaulem dentatum contractis, superioribus ramealibusque minoribus subpanduratis sessilibus; pedunculis setaceo-bracteatis; involucri semipollicaris vix calyculati bracteis angustissimis numerosis; ligulis fere semipollicaribus; acheniis strigoso-canescens. — Shady places in the Mapula Mountains.

PINAROPAPPUS JUNCEUS. Caulibus gracillimis 2–3-pedalibus superne corymboso-ramosis; ramis monocephalis; foliis minimis subulato-setaceis (radicalia desunt); capitulis iis *P. rosei* dimidio minoribus; floribus paucioribus. — Mapula Mountains, on grassy slopes.

IPOMŒA PRINGLEI. Bipedalis e caudice nodoso crasso, glaberrima; caulibus erectis patenti-ramosis; foliis subsessilibus pinnatipartitis in segmenta 5–7 lineari-filiformia integerrima imave bifida; pedunculis folium superantibus obsolete bibracteatis unifloris; sepalis rotundatis capsula fere semipollicari brevioribus; corolla purpurea infundibuliformi tripollicari! — Foot-hills of the Santa Eulalia and Mapula Mountains, near Chihuahua. A species of the *I. stans* rather than of the *I. capillacea* group, very handsome, and well worth bringing into ornamental cultivation.

PENTSTEMON ROTUNDIFOLIUS. Species insignis (e grege *P. centranthifolii*?), glaberrimus, glaucus; caulibus e basi lignosa aperte ramosis paniculato-plurifloris; foliis crasso-coriaceis orbiculatis integerimis (majoribus sesquipollicaribus), imis in petiolum subalatum contractis, cæteris arcte sessilibus, ramealibus parvis, floralibus minimis subcordatis; pedunculis pedicellisque gracilibus; sepalis ovalibus lin. 2 longis; corolla miniata pollicari tubæformi apice subæqualiter 5-loba, lobis lato-ovalibus (lin. 2 longis), fauce genitalibusque glabris; antheris post dehiscens explanatis; capsulis lato-ovatis lin. 2–3 longis pedicello arcte recurvato pendulis. — Mapula, Potrero, and other mountains, near Chihuahua, hanging from seams of cliffs, long-enduring, apparently flowering for most of the year.

CORDYLANTHUS WRIGHTII, Gray, in Bot. Mex. Bound. 120, is in the collection, but the corolla is pure yellow. Perhaps it was so in Wright's and Rothrock's specimens. It should have been stated that the filaments are strongly and unilaterally villous.

3. *Miscellanea.*

ANEMONE OREGANA. E grege *A. nemorosa*, *trifolia*, et præsertim *Udensis*; foliis involucribus 2-3 (sæpius 2); foliolis indivisis inæqualiter dentatis vel integriusculis ovalibus oblongisve obtusis vel folii radicalis obovatis (1-2-pollicaribus); sepalis ($\frac{1}{2}$ - $\frac{3}{4}$ -pollicaribus) cum filamentis læte purpureis vel cæruleis; stylo ovario haud longiore (nec ut in *A. Udensi* elongato). — Hood River, Oregon, *Mrs. Barrett*, and adjacent parts in Washington Territory, *Suksdorf*. The Pacific coast has various forms of *A. nemorosa*, some with less acute and less lobed leaflets than is common at the East. But I think it does not directly vary into the present species, which would rank between *A. trifolia* of the Old World and *A. Udensis* of Eastern Asia.

VIOLA HOWELLII. *Canina*, *V. mirabilis* proxima; innovationibus basi haud squamoso-imbricatis; stipulis infimis laciniato-dentatis, iis ramorum vel sarmentorum brevium integris; scapis pedunculisve gracillimis; calcare corollæ brevi (lin. 2 longo) crasso. — *V. mirabilis*? Gray in Bot. Gazette, xi. 293, not L. — I had this only from damp fir woods in the vicinity of Portland, Oregon, collected by Mr. T. Howell, and doubtfully referred it to the old-world *V. mirabilis*. I now have abundant specimens collected by Mr. Suksdorf in Klickitat Co., Washington Territory, which show that it is quite distinct both from that well-marked species and from any of our forms of *V. canina*.

SOLIDAGO ERECTA, Pursh. This and *S. elata*, Pursh, were accidentally omitted both from the Synoptical Flora in 1884 and from the Supplement in 1886. They were to have been mentioned as among the uncertain species on pp. 143, 144. From my notes made, in 1881, upon the original specimens in the Banksian herbarium, it would appear that *S. erecta* answers to *S. bicolor*, var. *concolor*; and that *S. elata*, as to the plant of "New Jersey, Bartram," which may be taken as the proper original of that species, is the same. And a smoother form, which I have referred sometimes to this same variety and sometimes to *S. speciosa*, var. *angustata*, appears to be *S. erecta*, Ell. I think that a species under the name of *S. erecta*, Pursh, is to be reinstated, one which is well represented by a plant common in the vicinity of Washington, and that it will include most of *S. bicolor*, var. *concolor*, Torr. & Gray, and some of *S. speciosa*, var. *angustata*, Torr. & Gray. But the limits and the characters are not yet satisfactorily determined.

PENTACHÆTA ORCUTTII. *P. aureæ* subsimilis; capitulis parvulis; involucri villosopubescente, bracteis viridioribus; ligulis brevioribus; pappi setis 8–10 capillaribus basi haud dilatatis caducis! — Vallecito, in the northern part of Lower California, *C. R. Orcutt*, May 4, 1886.

FRANSERIA CAMPHORATA, Greene, Bull. Calif. Acad. i. 192. Var. **LEPTOPHYLLA.** Gracilior, tomento tenuissimo evanescente; foliis minoribus tenuisectis, lobis minimis. — Near San Fernando, Lower California, *Orcutt*, 1886. The resinous atoms which give the balsamic odor are much more manifest than in Palmer and Greene's type, the tomentum being minute and evanescent. The minute coating of stipitate glands on the fertile involucres well characterizes the species.

VERBESINA DISSITA, Gray, Proc. Am. Acad. xx. 299. Fine flowering specimens, from "La Grulla," show the species with larger heads and more showy rays than was supposed, and require the following modifications of the character: foliis papilloso-scabridis, superioribus sæpe alternis, inferioribus nunc basi lata sessilibus; capitulis latis semi- vel sub-pollicaribus; involucri campanulato, bracteis obtusis, extimis subspathulatis brevioribus, interioribus linearibus acutiusculis; ligulis 8–10 obovato-oblongis subpollicaribus læte aureis.

GENTIANA LINEARIS, Frœl., var. **LATIFOLIA.** Robusta; foliis omnibus basi haud contracta arcte sessilibus, imis oblongo-linearibus, superioribus ovato-lanceolatis, summis flores capitatos involucrantibus; appendicibus plicarum corollæ latis aut acutatis aut subtruncatis lobis sæpius dimidio brevioribus; bracteis (etiam formæ typicæ) nunc tenuissime scaberulis. — Of *G. linearis*, var. *lanceolata*, it is said in the Synoptical Flora that it "approaches narrow-leaved forms of *G. alba*." The variety here characterized is the form from Lake Superior which, in the work referred to, I had referred to *G. alba*, though there is no proof that it has the yellowish-white corolla of that species; and I have some reason to suppose that it is also *G. rubricaulis* of Schweinitz from the same region. It now comes to us from New Brunswick, ten or twelve miles north of St. Stephen, in Charlotte Co., where it was discovered in July and August last by Mr. J. Vroom and Mr. W. F. Ganong, with flowers as blue as those of *G. Saponaria* (which has quite different plicæ), and with foliage like that of *G. Andrewsii*. Although completely connecting forms are wanting, I must conclude that we have here only an extremely broad-leaved variety of *G. linearis*. It was collected at Lake Superior first by Prof. W. D. Whitney;

then, in 1848, by Gen. C. G. Loring (along with a narrower-leaved form, which I referred to var. *lanceolata*); afterwards, in 1863, by the late Dr. Robbins, in very broad-leaved specimens.

FRASERA CUSICKII. *F. nitidæ* soror, pariter glabra, humilior; caulibus subscapiformibus 3–8-pollicaribus quandoque folia radicalia haud superantibus; thyrsos aut simplici capituliformi aut spiciformi interrupto; corolla majori cærulescente; lobis fere semipollicaribus ovalibus obtusis cum apiculo glandula viridi lineari instructis; squamis inter stamina pro genere maximis orbiculatis concavis cæruleis fere integerrimis ovarium superantibus. — Hillsides of Grande Ronde Valley, N. E. Oregon, *Cusick*, 1886.

PHLOX DOLICHANTHA. *P. longifoliæ* var. *Stansburyi* proxima; corollæ (pariter roseo-purpureæ et albescens) tubo sesquipollicari calyce triplo longiore, lobis rotundatis integerrimis; staminibus altioribus faucialibus; stylo capillari; stigmatibus ad antheras imas attingentibus. — S. E. Nevada in the Pahrnatagat Mountains, *Miss Searls*, 1871. S. E. California, station not recorded, probably in the Mohave region, *Parry & Lemmon*, 1876. Bear Valley in the San Bernardino Mountains, at 6,000 feet, *Parish*, June, 1886.

PHACELIA HIRTUOSA. *Eutoca*, hinc *P. lasæfoliæ* illinc *P. brachylobæ* affinis, cinereo-puberula et more prioris setis patentissimis pl. m. pungentibus hispida; caule pedali e radice annua; foliis oblongis sinuato-pinnatifidis imisve subpinnatisectis, lobis vel segmentis inciso-dentatis; floribus in spicis cymæ densis vix elongandis subsessilibus: corolla infundibuliformi-campanulata (lin. 3–4 longa) albido-cærulescente, squamulis internis semi-ovato-lanceolatis prorsus adnatis; staminibus *inclusis*; capsula oblonga 25–30-sperma sepalis fructiferis lineari-oblancoelatis (nunc uno latiore 4–5 lin. longis) subdimidio brevior; seminibus rugoso-tuberculatis. — San Telmo, Lower California, *Orcutt*, May 17, 1886.

ORYCTES NEVADENSIS, Watson. Mr. W. H. Shockley has recently supplied to us, from the neighborhood of Candelaria, Nevada, copious and good specimens of this rare Solanacea; from which the generic character may be improved as to the seed and embryo, but hardly in any other particulars. — Calyx herbaceus, alte 5-partitus, fructifer parum accrescens, lobis lanceolatis. Corolla (flavida) suburceolato-tubulosa, calycem parum superans, lobis 5 brevissimis fere deltoideis æstivatione subinduplicatis per anthesin vix patentibus. Stamina 5, basi corollæ inserta: filamenta filiformia, tria corollæ æquilonga, duo breviora: antheræ didymæ, loculis ovalibus. Stylus filiformis elonga-

tus : stigma capitatum, bilobum. Ovarium glabrum, biloculare, pluriovulatum. Bacca sicca, sphaerica, calyce immutato subinclusa, demum rumpens, 10–15-sperma. Semina fere orbiculata, plana, testa tenui scabroso-reticulata, ala angusta hyalina cincta. Embryo in albumini parco subcyclicus, fere filiformis.

LYCIUM SHOCKLEYI. Inter *Calycina* et *Longiflora* quasi medium, humile, glabrum; ramis robustis; foliis subcarnosis angusto-spathulatis semipollicaribus; floribus e nodis fasciculifoliis *sessilibus* tetrameris; calyce angusto-campanulato, tubo (lin. 2–3 longo) dentibus oblongis obtusis patentibus subduplo longioribus; corolla cylindracea e calyce paullo exserta intus prorsus nuda, lobis brevibus rotundatis; staminibus sub fauce insertis, filamentis brevissimis, antheris oblongis; bacca globosa lin. 3 diametro in calyce distento inclusa.—“A low bush, in open sand,” Candelaria, S. W. Nevada, *W. H. Shockley*.

GALVESIA JUNCEA. *Maurandia juncea*, Benth. Bot. Sulph. 41. *Saccularia Veatchii*, Kellogg, Proc. Calif. Acad. ii. 17, & Bull. Calif. Acad. i. 144, with colored plate, reproduced from *The Hesperian*, July, 1860. *Antirrhinum* (*Gambelia*) *junceum*, Gray, Proc. Am. Acad. vii. 377, & Syn. Fl. ii. 254, 439. Excellent specimens, in flower and fruit, have recently been collected by Mr. Orcutt in Lower California, where it appears to abound. As Mr. Ball has indicated (in Jour. Linn. Soc. xxii. 152), this is a strict congener of *Galvesia Limensis*; and so is the *Antirrhinum* (*Gambelia*, Nutt.) *speciosum*, notwithstanding the fact, as observed upon the plant once in cultivation here, that the palate actually closes the orifice of the corolla. Indeed, it may be seen that the palate nearly or quite does so in *G. juncea* and *G. Limensis*, at least in early anthesis; although the stamens soon lengthen so that the anthers slightly project from the gorge; and in dried specimens lateral flattening causes the lips to gape. But it is hardly less so in our Californian true *Antirrhina*, although the gorge is well closed in life. It becomes evident, therefore, that the genus *Galvesia*, properly including our two Lower Californian species (*G. juncea* and *G. speciosa*), should rest mainly on the narrow and strictly tubular corolla, confirmed by its marked habit and geographical distribution. *Gambelia*, Nutt., is accordingly reduced to a synonym.

CASTILLEIA SUKSDORFII. *C. miniatæ* peraffinis, villosula, surculis subterraneis filiformibus copiosis perennans; radicibus fibrosis; caulibus sparsis simplicissimis (1–2-pedalibus) strictis multifoliatis; foliis membranaceis angusto-lanceolatis sursum attenuatis integerrimis sum-

misve trifidis, floralibus viridibus "superne subito læte miniatis linea flava interjecta." — Alpine meadows and springs of Mount Adams, Washington Territory, at 6,000 or 7,000 feet of elevation, *Suksdorf*, 1885, 1886. — Mr. Suksdorf calls my attention to the differences between this plant and all the forms of *C. miniata*; which, once seen, are conclusive as to the distinctness of the two species. *C. miniata* grows in clumps of many stems from a stout stock or perennial root, and is wholly destitute of the filiform subterranean creeping shoots by which the related species loosely spreads and multiplies; its stems commonly bear one or two flowering branches near the summit, and the red of the bracteal leaves is diffused, instead of ending abruptly.

BOSCHNIAKIA, C. A. Meyer. — In the supplement to the *Gamopetalæ* of my Synoptical Flora, I hurriedly noted that *B. strobilacea* extends northward to Oregon, and that it has a deeply favose seed-coat. I neglected to state that those seeds are globose and large, even as much as a line in length, which needed mention the more that, in the generic character, the seeds are said to be minute. Those of *B. glabra* I find to be only a quarter of a line long, not "subglobose" however, but mainly oblong. I ought also to have stated, what Mr. Howell's specimen plainly showed, that the capsule of *B. strobilacea* is four-valved, answering to the "four equidistant placentæ" in the character of the section, and that the style remains slender, and is at length deciduous from the summit of the globose capsule. These points are now (July, 1886) brought to my attention by my good correspondent, Dr. C. L. Anderson, of Santa Cruz, California, who also sends fine and large fruiting specimens. I have not seen the Himalayan species, which is described as having "orbicular" and "compressed" seeds, of about a third of a line in length, and large reticulations to the hyaline testa. Comparing these with the seeds of *B. glabra*, the latter are said to be ellipsoid and the hundredth of an inch long, with a close testa. Now in our specimens from Sitka they measure much more than that, as above stated, and they are, as Bentham described them, reticulated, the coat decidedly loose and minutely favose. I have now reason to think that *B. Hookeri* and my *B. strobilacea* may be the same species. For Dr. Macoun sends us a form of the latter of a size not larger than Hooker's figure of the former, still, however, with the broad and partially imbricating scales of *B. strobilacea*. However that may be, the two sections of the genus may be contrasted as follows, while *B. Himalaica* may be of a third.

§ 1. Stamina basi nuda: placentæ 2 bilobæ: capsula bivalvis, stylo diu persistente demum fisso rostrata. Semina parva, oblonga. — *B. glabra*.

§ 2. Stamina basi villosa: placentæ 4 æquidistantes: capsula globosa, 4-valvis: stylus tenuis demum deciduus: semina sat magna, sphaerica, testa laxa favosa. — *B. Hookeri* is probably of this section in all its characters. *B. strobilacea* is perhaps only the well-grown form of it. An examination of the original at Kew should determine this.

Addendum to Papaveraceæ.

PAPAVER CALIFORNICUM. *P. dubio* perquam simile, pilis parcis forte tenuioribus; corolla crocea oculo citrina; capsula (circiter semipollicari) clavato-turbinata 6–11-mera, valvulis dentiformibus subquadratis lineam longis latisque placentas nudantibus dehiscente; seminibus rete grossa parca fenestrali. — Santa Inez Mountains, California, coll. John Spence.

One is naturally slow to believe in an indigenous Californian Corn Poppy. In the spring of 1886 that excellent florist and acute observer, Mr. Spence, of Santa Barbara, sent me some flowers of this plant which he had hastily picked up in the Santa Inez Mountains, at the elevation of 1,500 or 2,000 feet, far away from any cultivation, on ground which had been covered with Manzanita, but had been burned over the year before. These flowers and forming pods, so far as could be told by inspection, might have belonged to *Papaver dubium* or *P. Rhæas*, species which might be expected to abound in old Californian wheat-fields, although they had not there been met with to my knowledge. At this moment I receive from Mr. Spence a supply of mature capsules and seeds gathered last summer at the same station, or partly at another similar station, about forty miles farther west, "far away from any trail," on ground which had similarly been burned over; and with these some flowering materials raised from their seed in his conservatory. These capsules are so like those of *P. dubium* that, apart from their history, they might pass for such. But they all (nearly one hundred in number) have the peculiarity described in the character. They dehisce — just as do those of their compatriot and almost congener *Meconopsis heterophylla* — by decided valves, of a line in length, exposing the septa for that length, recurving, and at length breaking off square at their base. Moreover, the seeds — which are

much like those of our *Meconopsis* — have far fewer and coarser and more quadrate reticulations than those of *P. dubium*. I conclude, therefore, that Mr. Spence's plant is an indigenous species. I suspect that it may not be so very rare and local, and that its close resemblance to our *Meconopsis* has allowed it to be overlooked. The habit of the two is quite similar. So far as I have seen the foliage, I could not certainly distinguish the two except by the sparse hairiness of the true Poppy. This discovery suggests a probable genealogy of our American *Meconopsis*.

Emendata.

Page 273, lines 11, 12, to be

Scarious or partly scarious rounded sepals plane : gynœcium 2-merous.

Sepals equal, emarginate at base and apex : petals 4 : stamens 3, twice the length of the petals : filaments filiform : anthers linear-oblong : style long, filiform : stigma 2-lobed : capsule globose-ovate, few-seeded.

8. SPRAGUEA.

Sepals mostly unequal : petals 2 to 4, small : stamens 1, 2, or 3, shorter than the petals : filaments subulate : anthers oval or oblong : style short or hardly any : stigmas 2 : capsule linear to oval, 6-24-seeded.

9. CALYPTRIDIMUM.

Page 299, note, the paragraph beginning "A. ACERIFOLIA, DC. Prodr. i. 459," should be omitted.

Page 302, before "HIBISCUS," add

KOSTELETZKYA (ORTHOPETALUM) THURBERI. Herbaceous and merely scabrous-puberulent : leaves round-cordate and angulate-trilobed, uppermost oblong-ovate and acuminate, serrulate : flowers numerous in a loose and naked compound panicle : bractlets of involucl setaceous : calyx (3 lines long) not accrescent : corolla less than an inch long, rose-color : stamens rather few near the apex of the filiform column : capsule acutely 5-lobed, hispid along the angles. — *K. paniculata*, Torr. Bot. Mex. Bound. 40, not at all of Benth., which has recently been collected by Dr. Palmer.